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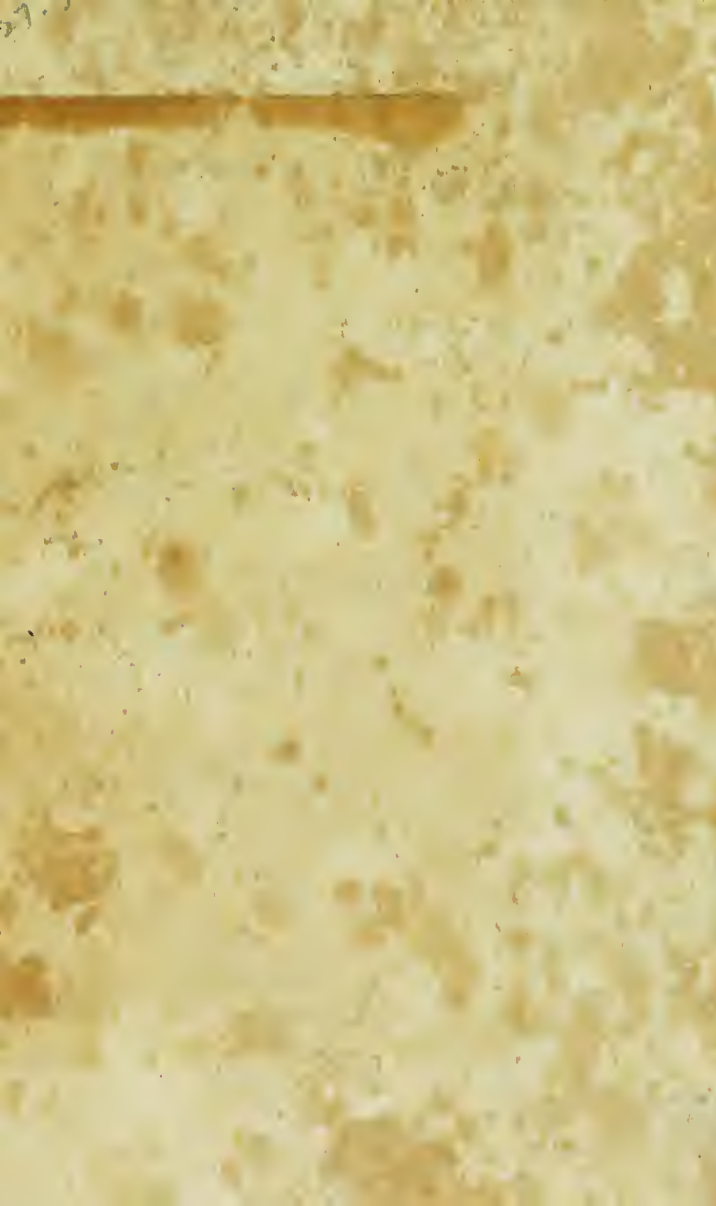
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A

# PRACTICAL TREATISE

ON THE

HISTORY, PREVENTION, AND TREATMENT

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WITHDRAWN

# EPIDEMIC CHOLERA,

DESIGNED BOTH FOR THE

PROFESSION AND THE PEOPLE.

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BY DANIEL DRAKE, M. D.

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CINCINNATI:

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## PREFACE.

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THE object of the Author of this little volume has been, to present the physicians and reading public of the valley of the Mississippi with an authentic digest of the most important facts relative to the Causes, Symptoms, and Treatment of the Epidemic which is now impending.

Most of the chapters will be found sufficiently divested of technical terms, to be intelligible to the general reader; while no part, the author flatters himself, will be thought beneath the dignity of the profession.

As the work has been most hastily compiled, in the midst of pressing engagements, and under continued ill health, it will be found greatly deficient in gravity and polish of style; but not, the Author hopes, in the general accuracy of its statements.

It has been his aim throughout, to adapt it, as much as possible, to the condition and constitutions of the people, among whom it is designed to circulate, and to whom, he trusts it will be of some value; not merely in the approaching crisis, but annually, when cholera morbus and cholera infantum are reproduced upon us, by the heat of summer. Indeed, all that is said on the Prevention, and much of what relates to the Treatment of the Epidemic, is as applicable to our indigenous, as to the dreaded variety of foreign Cholera.

*Cincinnati, Ohio,  
July 20, 1832.*

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# EPIDEMIC CHOLERA.

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## CHAPTER I.

### GEOGRAPHY AND CHRONOLOGY OF THE DISEASE.

THE word CHOLERA, a term introduced into every modern language, is formed from two Greek words, and signifies, a flow of bile. Joined, as it has long been, with a Latin word, *Morbus* or disease, a phrase is formed, the meaning of which is generally understood. It literally imports a disorder in which bile flows off by vomiting and purging; but is also applied to attacks attended with the latter symptoms, although no bile may be discharged.

Such a malady may arise at any season of the year, in persons who accidentally swallow certain poisons, as tartar emetic, or corrosive sublimate; or eat, by mistake, deleterious mushrooms; indulge themselves in the use of indigestible articles of food or drink; or ingurgitate excessive quantities of healthy aliment. This is called, OCCASIONAL or SPORADIC CHOLERA.

In hot countries, and in the temperate zone about the period of greatest heat, which, in the valleys of the Western States, is generally from the twentieth of May to the first of August, cholera morbus, as the disease is named in adults, and the cholera infantum, or the same malady in children, is a common complaint. This is **ENDEMIC CHOLERA**, and arises directly from heat, or from some cause that is annually reproduced by heat and moisture acting on decomposable substances, or from something connected, in some unknown manner, with a summer temperature; being always most intense and general, in the hottest weather. This malady, as we all know, is often fatal; and when it kills promptly, the symptoms do not differ widely from those of the epidemic, which is the object of this volume.

**EPIDEMIC CHOLERA**, unlike the last variety, in not constantly arising and disappearing with the hot season, has spread from country to country; and prevailed, though not with equal violence, throughout the whole year, and in the most opposite topographical circumstances. This is the pestilence which now alarms the civilized world, and threatens shortly to visit us.

### *Origin and Progress of Epidemic Cholera.*

The term *Asiatic*, so generally applied to this variety, indicates its origin. From time immemorial, it has occasionally ravaged India, being in fact an endemic of that country, as the cholera

morbus is of this. It has not often happened, however, that the disease has travelled beyond the limits of the hot region, in which it was generated.

The present Epidemic seems to have commenced in the year 1817, in the delta of the Ganges. The first accounts of it were from the city of Jessore, eighty or one hundred miles northeast of Calcutta, in the month of August; but it was afterwards ascertained that it prevailed in some parts of Nuddeca as early as the month of May. Before winter, it laid waste a great number of towns, along the Ganges, and in various parts of the peninsula of Hindoostan, including Calcutta, where it manifested itself early in August. Thus, the Epidemic, during the same unpropitious summer, broke out almost simultaneously in different and distant places.

It does not comport with the plan of this work, to trace its progress, from year to year, over Asia, till it entered Europe, in 1829; but I may remark, that for a period of twelve years, it prevailed constantly in some part of Asia. Extending eastwardly, it invaded Siam, Cochin China, China proper, and reached Peking in 1825. Leaving the continent, it visited Java, the Philippine and many other islands,—extending even to Banda, nearly in the Pacific ocean, in longitude  $128^{\circ}$  east. To the south of the Indian peninsula, it assailed the island of Ceylon, and even reached Bourbon, in the southern hemisphere. To the west, it passed the Indus, meandered the north-

ern shore of the Persian gulf, ascended the Tigris and Euphrates, and arrived at Antioch, Aleppo, and other places, near the eastern extremity of the Mediterranean. Arabia seems to have resisted its progress to the south; but to the north, different parts of the Persian empire were signally scourged, and the pestilence spread quite to the sources of the Ganges and Indus. The Himmalah mountains alone seemed to stay its progress.

Before proceeding to trace the course of the Epidemic in Europe, let us enumerate some of the facts connected with its Asiatic history.

1. As already stated, it appeared in various places nearly at the same time.

2. After visiting a town or city, it frequently, within a few months, or in some subsequent year, returned upon it with equal or greater violence.

3. It often left towns and narrow slips of country unaffected, prevailing quite around them; and sometimes attacked them subsequently, when adjoining places were healthy.

4. It affected both town and country; but most of the reports concerning it are drawn from the former.

5. In towns, it has generally raged with the greatest virulence where the population was most dense. It has sometimes confined itself to one side of a street, and often left considerable portions of a city untouched, although free intercõmmunication existed.

6. In several instances, it has seemed to be introduced into towns by ships, or caravans of travellers; at least, has commenced soon after their arrival, and spread rapidly, when it did not exist there before.

7. It has frequently arisen in towns, which had not had any known intercourse with places in which the disease prevailed. It has appeared in ships at sea, which, for a long time before, had not been exposed to it on land.

8. It has constantly been disposed to assail large assemblages of people.

9. The armies of Asia have been peculiarly obnoxious to it. When marching, they have been suddenly and mortally assailed. Whenever the army has dispersed in small bands, the disease has ceased. One wing of an army has sometimes been affected, while the other continued healthy. A detachment of troops has, sometimes, while afflicted with the disease, rejoined the main army, without communicating the malady. A marching army has been suddenly attacked, and as suddenly relieved, by changing its place of encampment. In marching, the disease has appeared and disappeared in an army, two or three times, according as it prevailed or did not prevail, in the districts over which the march was directed.

10. All over Asia it has prevailed most on the margins of rivers, near their mouths, and in other damp and vaporous localities.

11. It has often prevailed on one side of a river, for some time, and then crossed to the other.

12. Sometimes it has attacked the inhabitants of dry and elevated places. It has even ascended to the height of five or six thousand feet.

13. It has often traversed countries in the direction of their great roads; but to this there are many exceptions.

14. It has equally affected the Hindoos, the Europeans resident in India, and the natives of that country, descended from European parents.

15. Every where in Asia it has fallen most heavily upon the alarmed; the poor; the aged, and those enfeebled by previous disease or great exertion; those who lodged in confined, damp, and dirty places; the intemperate; the half famished; and those who exposed themselves to the night air.

16. In India it has generally affected adults much more than children, and men more than women; in some places, however, the reverse of the latter has occurred.

17. Cholera patients have often been received into the general hospitals, without communicating the disease to the other patients; on the other hand, the disease has sometimes seemed to spread in this manner.

18. Physicians and nurses have been observed to be less subject to attacks than other people; but they have occasionally been affected; and in a few

instances have appeared to contract the disease from such exposure.

19. The disease has sometimes prevailed throughout all seasons of the year, but has generally been suspended or much mitigated in winter.

20. In most instances, its invasion has been sudden; and, like other epidemics, it has been most fatal at the onset. The subsequent cases have become milder and more manageable. At length it has disappeared, leaving, in many places, a large number untouched. The proportion of those affected by it, has varied exceedingly in different towns. Its duration has sometimes not exceeded a fortnight; but in other cases, it has continued for two or three months. In general, the more dreadful the energy of the invasion, the shorter has been its duration.

21. In various parts of India and Persia, earthquakes have occurred several times since the epidemic first arose. In one instance it appeared with great mortality in a body of troops, immediately subsequent to a violent tornado. At other times it has ceased after thunder storms.

22. The winds have not seemed either to hasten or retard the march of the epidemic.

23. It has *commonly* made its attacks in the latter part of the night.

24. In many places, mortal diseases in the domestic animals, both birds and quadrupeds, have been observed to precede or accompany its visitations upon the inhabitants.



25. It has not ceased in Asia since its introduction into Europe.

Such are the principal and the most important results of the observations made in Asia. Let us now turn our attention to Europe.

For twelve years the epidemic ravaged India, Persia, and Syria, without passing the borders of the Caspian sea, and the summits of the Ural mountains. In the month of August, 1829, it entered Russia. The town of Orenburg, situated on the right bank of the river Ural, in latitude  $51^{\circ}$  N., and longitude  $72^{\circ}$  E., has generally been regarded as the place first affected. I shall transcribe from the elaborate report of a committee of the French Academy of Medicine, made to the government in July, 1831, what seems to be an impartial digest of the facts in this case.

‘Behold then the Cholera primarily established in a city which scarcely presented any general cause of insalubrity. It is true, that the season immediately preceding that in which the Epidemic appeared, had been irregular, inconstant, and marked by great atmospheric vicissitudes; the humidity, especially, had been great and sudden, succeeding prolonged heats and extreme drought.

‘It is also true, that a considerable quantity of fruits of an indifferent or bad quality had been gathered in this year, and the inhabitants had freely eaten of unripe water-melons and cucumbers.

‘It is also true, that the *koumiss*, a species of drink



made from fermented mare's milk, had failed, and still more the *knout*, an analogous but better drink, made from the milk of the sheep and the cow.

‘But already, in antecedent years, had all these anti-hygienic conditions been frequently presented, in the same degree, and in similar combinations, yet without the least appearance of Epidemic Cholera.

‘Let us further add with respect to fruits, that subsequently to their absolute interdiction, and notwithstanding the rigid measures adopted by the public authorities to effect their total exclusion from the city, the disease increased with greater activity and counted a greater number of victims.

‘The Cholera having appeared then at Orenburg, notwithstanding the salubrity of this city, it became necessary to seek elsewhere for its origin; the epidemic reason not being as yet presented to meditative minds, or rather this reason alone was not deemed satisfactory.

‘It is in this state of the question, that the origin of the disease has been attributed to an importation imputed, by some, to the caravans arrived from Boukaria and Khiva, and by others, to the commercial relations established with the neighboring hordes of Kirguis-Cossacks.

‘The Kirguis, a wandering and half-savage people, encamped in the immense *steppes*, beyond the Ural mountains, being in constant commercial intercourse with Turkestan, Boukaria, and Khiva, have long

been in the habit of furnishing Orenburg with sheep, felt, camlets, &c. Now, when the Cholera appeared at Orenburg, we know that the epidemic was extending its ravages in Chorazan, in Asia, and Persia.

‘Let us, however, examine both assertions, that is to say, the importation of the Cholera by caravans, and by the Kirguis.

‘On the 26th of August, 1829, at nine in the morning, surgeon-major Smirnorff detected the Cholera Morbus in Andre Yvanhoff, a soldier of the 3d battalion of the line, then in garrison at Orenburg, who was carried to the military hospital at Orenburg, where he died at about the expiration of twelve hours from the commencement of the disease.

‘From the 26th of August to the 9th of September, no other person in Orenburg was attacked with the Cholera.

‘On the 9th of September, at 11 o’clock in the night, another soldier, of the same battalion of the line, likewise attacked with this malady, was brought to the military hospital. He died towards 5 o’clock in the evening of the following day.

‘The day after, September 10th, two other patients were sent to the hospital, one of whom died, the other was cured. In both these cases, the disease had progressed with less rapidity than in the two preceding.

‘On the 11th, a soldier of the same battalion was attacked and carried to the hospital; then on the

14th, a soldier of the battalion of invalids; again, on the 16th, two other soldiers of the same battalion; and, finally, on the 17th, two non-commissioned officers.

‘During the whole of this time, and until the 18th of September, only two individuals among the citizens of Orenburg had been seized with the malady; both of whom died. One was an excise officer, the other a tradesman.

‘The commerce of Orenburg, a city altogether commercial, has for a long time been maintained in frequent, extensive, and important relations with Asia, India, and Persia; it is at least since 1813, that the city of Orenburg has been in the habit of admitting annually the caravans coming from Kiachta and Boukaria: now, the Cholera reigned epidemically in these countries during the month of August, 1817; and it was not until August, 1829, that it first made its appearance at Orenburg.

‘The caravans from Boukaria and Khiva arrived in July, (the 20th at the latest,) at Orenburg, were admitted into the Court for Strangers, after sanitary visits and inspection, but the Cholera was not manifested until the 26th of August.

‘Convoys making a part of these caravans, had entered about the same time into the fortresses of Orstia and Troitzka, yet the Cholera did not appear in these two fortresses.

‘The guards and camel-drivers, hired by these caravans, in one place and in another throughout their route, have entirely escaped the disease.

‘It must also be noted, that these Asiatic traders loaded and unloaded their camels during their journey; that whenever they arrived at an *aoula*, or encampment of Kirguis, they made numerous exchanges of merchandize for provisions of every sort, which consequently rendered it necessary to unpack the bales in which they were contained; yet, notwithstanding these different operations, there has not been a single instance in which Cholera was communicated.

‘From the 26th of August, the day in which the first patient, the soldier Yvanhoff, was attacked by the disease, and who died with it on the same day, until the 9th of September, there was not a single individual seized with the Cholera at Orenburg.

‘The Cholera suddenly makes its appearance among the poorer class of people, in individuals worn down by hard labor and debilitated by extreme want. It was not first observed among custom-house officers in continual communication with the suspected Kirguis, and in constant contact with the suspected articles of merchandize. It has not attacked the merchants who purchased camlets, felts, and furs; it has respected easy or rich people who carried them. The traffic-market of Orenburg, situated at a distance of three *versts*\* from the city, on the right bank of the Ural, where, during the whole summer and one-half of the autumn, the Russian and Asiatic merchants reside and exchange their

\* About two miles; a *verst* being nearly two-thirds of an English mile.

merchandize with that of the Kirguis, it would seem ought to have been the first theatre on which the disease appeared; yet, notwithstanding, it was in a lesser proportion and at a later period, that these quarters were attacked.

‘The Cholera had existed a long time in the city of Orenburg, when it broke out in the badly constructed fauxbourgs which constitute the boundaries of it.

‘Now it was not until the 28th of September that information was received of the first appearance of the Cholera in the environs of Orenburg; and, surprising circumstance! whilst the villages nearest to the city, having intimate relations and constant communication with it, were altogether exempt from the Cholera; whilst the fortresses adjacent to Orenburg, and situated in the line of the two principal roads which terminate at this place, preserved their habitual salubrity,—during this time, the Cholera exhibited its accustomed ravages in villages at some distance from Orenburg, and also in a fortress situated at more than a hundred versts from the city, which had maintained but very little communication with it.

‘The villages lying east from Orenburg, between the Ural mountains and the city, but beyond the latter, in the line of communication of Asia with Orenburg; these villages, Nieginka and Kaminoc for instance, although built along the upper Ural, and having free intercourse every hour, as well as

every day, with the city, have not been invaded by the malady.

‘In the military hospital of Orenburg, the Cholera began on the 26th of August, and did not cease its reign until the 20th of November; the number of persons attacked with the disease was two hundred and ninety-nine, of which number two hundred and twenty were cured, and seventy-nine died. We have stated above, that the garrison consisted of six thousand men.

‘In the city of Orenburg, the disease did not commence until the 15th of September; and on the 20th of November there was not, either in the city, or its suburbs, a single patient with the Cholera. Of the entire population of the city and its fauxbourgs, which is estimated at seven thousand, there were eight hundred and one patients, out of which number six hundred and eighty were cured, and one hundred and one died.

‘Immediately after the city of Orenburg, the first two villages attacked by the epidemic were the burgh of Rassipnoe and the village of Bicoulovoy, placed at a great distance from one another, upon two diverging routes, having intermediate to them a great number of other towns and villages which were not attacked at all or not until a later period, and also having much less communication with one another than each of them had with certain other places until then remaining unmolested by the disease.’

In making this long extract, from a work to which I am indebted for many of the foregoing facts, I do not propose, in this place, to enter on the difficult question of the mode in which Epidemic Cholera extends itself. I presumed that some discussion of the circumstances of its entrance into Europe, would not be without interest. Let us now inquire, whether, in its extension over that continent, it observed the same laws as in Asia.

However, the first appearance of Epidemic Cholera in Europe, was in reality six years before, at Astrachan, in the delta of the river Volga, not far from the Caspian sea. It is remarkable, that after prevailing for a time in that city, it ceased, without extending beyond its limits.

In 1830, about the 1st of July, it reappeared, and soon began to show itself to the east, the north, and the west. In the second week of October, it commenced in Moscow, where it prevailed till January. In the ensuing spring, 1831, it broke out in Archangel on the White sea, in lat.  $65^{\circ}$ , and on the 12th of June commenced in St Petersburg; where it raged for a time, ceased, and then recurred. A month before, it had manifested itself in Riga, at the mouth of the Dwina, in the southwest corner of Russia proper; and at Danzig, another town of the Baltic sea, in Prussia; having already affected most of the vast country, between that sea and the Caspian.

Meanwhile extending along the shores of the sea of Azof, and the northern side of the Black sea, it rav-



aged the southern provinces of Russia; and, overspreading Hungary and Poland, extended beyond them into Prussia and Austria, quite to Hamburg, on the Elbe. Dipping down the Dardanelles, it affected Constantinople, and recrossing into Asia Minor, fell with violence upon Smyrna, in lat.  $38^{\circ}$ , below which it did not occur.

As yet, it had not extended west of the 10th degree of east longitude; but in the Autumn of the same year, 1831, in which it ravaged the countries lying south of the Baltic, it appeared in England. Its onset was at Sunderland, a coal town, at the mouth of the river Wear, in the northeastern part of the kingdom. Well authenticated cases occurred in August, but no alarm was sounded, till the month of October. It prevailed till February, extending to the towns and villages on the Wear and Tyne, including New Castle, Gateshead, and other places, in the great coal district; and, extending into Scotland, raged with considerable mortality in the villages and country, quite to Edinburg and Glasgow, inclusive. In the month of March, it appeared in London, where, however, it affected comparatively but a small number. About the same time, without invading the centre and west of England, including the great commercial and manufacturing towns of Liverpool, Birmingham, and Manchester, it opened on ill-fated Ireland, and overran most of the island; being attended in many places with great mortality. In May, it broke out in Paris, and raged for two or three weeks, with deadly violence. What may have



been its spread in that kingdom, is not, at this time, known with any certainty.

Thus, the parts of Europe which remain unvisited, are Holland and Belgium to the north, and the states which border on the Mediterranean sea—Greece, Italy, Naples, Switzerland, the southern part of France, Spain, and Portugal—to the south.

Having briefly sketched the progress of the Epidemic in Europe, let us inquire, for a moment, whether its character has undergone a change on that continent. Many of the facts necessary to this inquiry are still wanting in this country. From what I have seen, I would say:

1. That the laws of its propagation seem to be the same in Europe, as in Asia. It has, as in its native country, extended itself along navigable rivers, and highways; sought out maritime towns; fallen heavily upon the great armies engaged in advancing and resisting the plans of despotism; passed by villages and districts of country, affecting places on both sides and beyond them; sought out the poor, the terrified, the afflicted, the badly lodged, clothed, and fed; the intemperate; the exposed; and the dwellers in damp and unventilated places. But it has, also, stricken many in the opposite of all these circumstances.

2. It has penetrated further north in Europe than in Asia; and, as we have just seen, has spared many southern countries, lying nearly in latitudes which it has repeatedly ravaged in Asia. It will doubtless reach them also.

3. It has prevailed more severely, in the winter season, in the high latitudes of Europe, than in the mild winters of India and Persia.

4. In many instances, it has appeared to be communicated from man to man; while, as in Asia, the atmosphere of the sick has generally seemed to be harmless; and it has broken out in several places where no suspicion of extraneous introduction could be raised.

5. Quarantines and military cordons, neglected, generally, in Asia, have been instituted and enforced in Europe, without resisting its progress.

6. The governments, and the medical men of Europe, both contagionists and non-contagionists, have satisfied themselves, that the disease cannot be propagated by inanimate objects of any kind.

7. The character of the Epidemic in Europe, has varied a little in two respects from its Asiatic type. First, it has been much more commonly preceded by diarrhœa, or some kind of intestinal irritation; and secondly, much oftener followed by a fever of the typhus form.

8. Its mortality, in proportion to the number attacked, has been greater in Europe than Asia. In the former it has sometimes been as high as one out two, and frequently two out of five; while in Asia, the average mortality has not exceeded one out of six or seven.

9. It is worthy of remark, that in London, a small number, proportionally, were affected, and the deaths exceedingly few, compared with many vil-

lages of the kingdom, allowing for the difference of population. In Paris, on the other hand, it attacked multitudes; ascended, in many instances, into the higher ranks of society, and proved extensively fatal; events well calculated to humble the pride of science, as that city is the great emporium of medical learning; the whole of which had been put into requisition, and such deliberate preparations made for the reception of the pestilence, as led many of its physicians to predict, that it would prove but a small calamity to the people of France!

10. The cause or causes which have produced such striking differences in its mortality, in different towns, have not yet been discovered.

Leaving the Old World, we come to contemplate Epidemic Cholera in the New.

From the gazettes, it appears that on the 9th of June, of the present year, a malignant cholera morbus suddenly broke out at Quebec, among the Canadian French, and wretched emigrants, chiefly from Ireland, who had, during the spring, been thrown in thousands upon the banks of the St Lawrence. It quickly spread over the city, and affected many of the natives in comfortable circumstances. In a few days it was at its height, and before two weeks, had sensibly declined; indeed, nearly ceased. On the 11th or 12th, the same malady manifested itself in Montreal, 120 miles further up the St Lawrence, where it raged with great mortality; but on the 24th of June was nearly extinct. Meantime it made its

appearance in many of the villages surrounding those two cities; and affected the Canadian French still more, it is said, than the emigrants, multitudes of whom had ascended the river as far as Montreal, and even above.

The question has been started, whether this be any thing else, than the ordinary endemic of the country, in an aggravated form? It is impossible, from the data, which have, as yet, reached Cincinnati, to resolve this question; but from the suddenness of the invasion, and its short duration, the multitudes taken down, its great prevalence among the poor and exposed, its alarming mortality, and the concurrence of symptoms, I am compelled, till other facts shall be made public, to regard it as an extension of the Asiatic Epidemic. The question whether it will extend into the United States, from Canada, will probably be answered in the affirmative, before these pages see the light. For, whether propagated by contagion or atmospheric influence of any kind, its entrance into our country is not likely to be prevented, unless the laws of its diffusion should be different in America from those of Europe and Asia. Moreover, we had, last autumn, a wide-spreading influenza, so often the precursor of more violent epidemics, and a visitant of Europe the year before the Cholera; and, at the present time, July 4th, there is in this city, and no doubt other parts of the United States, a great deal of diarrhœa, and many mild cases of endemic cholera morbus, both of which were

harbingers of the Epidemic Cholera in England. The pestilence may not, however, overspread the United States during the present summer, for it has often lingered a year on the confines of a country without entering, and then made a sudden and mortal irruption.

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## CHAPTER II.

### CAUSES OF THE DISEASE.

A DISEASE so wide-spreading and mortal as Epidemic Cholera, must of course have a powerful and pervading remote cause, but what it is, has not yet been discovered. The ingenuity of the profession has suggested several, but strong objections lie against the whole. Let us review them.

#### 1. *Sol-lunar Hypothesis.*

Epidemic Cholera has been ascribed to the influence of the sun and moon. But, as the disease has been progressive through various latitudes and longitudes, and persons have been taken down at every hour, from the new to the full moon, and from the latter to the former, the hypothesis of sol-lunar influence, would seem to be altogether visionary.

#### 2. *Cometary Influence.*

It has been supposed to depend on the approach of a comet, which is presumed to exert an effect on

the electricity of the earth or its atmosphere, unfavorable to human life. Such an influence, however, ought to bear some kind of astronomical relation to the great circles of the globe, and not to the courses of rivers. It should be simultaneous and universal, rather than local and meandering. Moreover, the present Epidemic commenced at least fifteen years ago, and the comet now approaching our solar system, is not yet visible in the northern hemisphere where the disease has chiefly prevailed; facts that would seem to *disprove*, what is not sustained by any positive argument or phenomenon.

### 3. *Geological Theory.*

The malady has been attributed to exhalations from the bowels of the earth; and the occurrence of earthquakes in Persia, *since* it commenced, has been cited as evidence in support of this, which may be called the geological hypothesis. It has the dignity of having been cherished, if not first suggested, by Sydenham. It can scarcely be doubted, that mineral fermentations, attended with the development of various gases, do actually take place beneath the surface of the earth; and that they sometimes escape into the atmosphere. But the progress of Epidemic Cholera, bears a relation to the condition of the surface of the earth, rather than the strata which lie beneath; and it is difficult to conceive of the occurrence of exhalations, in the locomotive manner in which the Epidemic has spread. On the whole, it

must be admitted that this doctrine is a mere hypothesis, unsustained by any positive facts.

#### 4. *Miasmatic Theory.*

Malaria or poisonous air, formed by the decomposition of dead vegetable and animal matters, acted on by heat and moisture, has with confidence been cited as the remote cause. In support of this theory, it has been alleged, and with truth, that the disease prevails most in hot and humid situations, which are supposed to send forth miasmatic exhalations; in close, dirty and ill ventilated cities; and at the season of the year when intermittent and remittent fevers, *said* to depend on malaria, are prevalent. It has, moreover, not unfrequently put on, after the first paroxysm, the type of one of them, or some other fever. Thus, the miasmatic theory is far more conformable to the ascertained facts, than either of the others, just mentioned, and deserves grave consideration. When we recollect, however, that in several instances it has prevailed in dry places and at great elevations; that it has continued, in some cases, throughout the winter; and that it is, and always has been, absent from many places on the surface of the globe, where heat, moisture, and decomposable matter, all the necessary requisites for the generation of malaria, abound, I am unable to assent to the miasmatic hypothesis, although so plausibly supported.



### 5. *Meteoratious Theory.*

It has been held by many, to result from some change in the mode of union, or relative proportions of the gaseous and ethereal fluids, which constitute the atmosphere. To this supposed change, one of our able countrymen, Dr Joseph Mather Smith, of the university of New York, has applied the term insensible *meteoration*. He supposes it to relate, chiefly, to the electric fluid; and, with many others, believes Epidemic Cholera to be the direct effect of some disturbance in the equilibrium of that fluid, or of electricity and magnetism combined. In the language of this school, Cholera is an uncontagious, meteoratious epidemic, like influenza. Others have preferred the opinion, that the assumed meteoration involves some change in the gaseous constituents of the atmosphere, and is connected, in some manner, with an excess or deficiency of oxygen, azote, or carbonic acid. To make the theory, in any degree, adequate to the explanation of the phenomena, it is necessary to admit an influence sufficient to begin and spread this meteoration, progressively, over the surface of the earth. The doctrine of ferments may be cited, in illustration of this supposed atmospheric change. A little leaven leaveneth the whole lump. A minute quantity of yeast, will start, in a large volume of fermentable liquid, an intestine movement, that will ultimately extend throughout the whole. Now, may not a similar fermentative action be excited in the atmosphere, and extend successively



over various places? Such a supposition would render the meteoration hypothesis applicable to the geographical history of the Epidemic, and give to it, at least a high degree of probability. It would account for the spread of the disease over diversified localities; for its occasional continuance through the winter; its progressive and sudden invasion; general prevalence in a particular district; and its sudden disappearance, after a brief reign of fifteen or twenty days. But the evidence of this meteoration change is wanting, or at least defective; and what is the ferment? Admitting the meteoration, we must still look further back, for a cause to excite it. Such an agent may undoubtedly exist, but as yet the proofs of its reality are altogether conjectural.

### 6. *Contagion.*

Contagion has every where had its advocates. In Asia these are few and feeble. The natives, it is said, do not view the Epidemic as communicable from the sick to the well; and the majority of European physicians, practising in that country, are opposed to the doctrine. The people of Europe, however, have dreaded it as contagious, the governments of Europe have met it as contagious, and the physicians of that continent have observed, experimented, disputed, wrangled, and written about its contagiousness, until they have split into several sects. A few believe it to be unconditionally and powerfully contagious, and capable of propagating itself without

extraneous aid; a greater number hold, that it is contagious only in an impure or malarious atmosphere, from confined air, personal filth, or public sources of miasmata; others, that a general meteoration or atmospheric distemperature of some kind is a necessary co-operative agent; and others, that it is, under all circumstances, non-contagious. It would seem that, with the progress of the malady over Europe, the number of ultra contagionists has been constantly diminishing, and that of the non-contagionists increasing. This, to those who are at a distance from the theatre of observation, is a fact which is not without its value.

The naked question is, do the bodies of those who labor under Epidemic Cholera, secrete and throw out a poison, either liquid or ærial, which, inhaled or swallowed by a healthy person, will excite the *same* disease in him? and can he, in the same manner, raise it in the system of a third? If so, the malady is contagious, and perpetuates itself by morbid secretion; otherwise it is not.

In support of the affirmative of this proposition, a great many facts are cited, going to show the communication of the disease from one person to another; the introduction of it into towns and villages by individuals affected with it; the immunity of families, small communities, and even cities, when they practised a rigid exclusion of all who were tainted; finally, the advocates of this theory dwell upon the advancement of the disease through fifty degrees of

latitude, over vast varieties of soil, through all the seasons, and especially, along high roads and navigable streams.

On the other hand, the non-contagionists refer to the acknowledged fact, that the medical and other attendants on the sick, are but seldom attacked; that it often limits itself to a single member of a family; that it has not often *appeared* even, to spread from intercourse with the affected; that it has repeatedly appeared in places where it could not have been introduced by human agency; that it sometimes occurs in all parts of a city in a single night, and reaches thousands in a few days; that it has appeared simultaneously in the different parts of certain districts; that it has prevailed in one wing of an army without extending to the other; that a detachment of marching troops, laboring under the disease, has joined another, encamped on a healthy spot, without communicating the malady; that it has broken out in ships long at sea; finally, that persons going from towns where it prevailed, have sickened in the country, and in villages, without infecting those around them.

To these positive facts it may be added, first, that the measles, small pox, vaccine disease, itch, hydrophobia, and other maladies, which generally or always propagate themselves by the morbid secretions which they generate, are found to be operative on almost all persons; while, in many places, a very small number only are seized with Cholera.

Secondly, that the same contagions are capable of raising, in others, the diseases of which they are respectively the products, independently of any predisposing or exciting causes; while the remote cause of Epidemic Cholera, whatever it may be, is comparatively harmless, except in certain situations, and under certain circumstances.

If, then, a contagion emanates from the bodies of Cholera patients, it is much less active than that of the small pox; can affect but a small number of those who live regularly, in comfortable circumstances; and is chiefly operative on those of enfeebled constitutions or bad habits, who live poorly, are exposed, labor under apprehension of the disease, or breathe an atmosphere impure from other causes. Such a contagion *may* exist, but direct proofs are wanting; and I know of few analogies that could legitimately be brought to the support of the doctrine. A contagion which should require so great a variety of conditions to give it activity, would certainly not be very dreadful.

The subject of what has been termed *contingent* contagion, properly falls into this place. The expression is not a correct one. A disease may be contingently communicable, but cannot be contingently contagious. A contagious effluvium is either exhaled, or not exhaled, from the body of a person who is ill, according to the nature of his disease. In small pox, such an exhalation always occurs; in pleurisy, never. In mild cases of the former, the

amount of exhalation may be so little, that under free ventilation the disease would be much less communicable, than when the circumstances were different; but still it is *positively*, not *contingently*, contagious. Let us apply this reasoning to Epidemic Cholera. In regard to contagiousness, it either belongs to the species which embraces small pox, or that which includes pleurisy. Suppose the former. If so, the epidemic is *always* contagious, though the amount generated may be so small, that unless the patient be kept in an unventilated place, where the contagious effluvia would accumulate, and those about him were strongly *predisposed*, by living in an atmosphere unhealthy from filth and confined air, he could not communicate the disease to them. Now, that the Epidemic is contagious, even in this feeble and almost harmless degree, remains, I think, to be shown.

If the Epidemic Cholera be contagious, it is important to ascertain the greatest length of time, that can elapse after an exposure, before the disease may show itself. Many contagionists have occasionally witnessed the disease, in a few hours after they supposed the poison had been inhaled. Two or three days have been stated as a more common period; and fourteen has, perhaps arbitrarily, been set forth as the ultimate term, beyond which the virus could not lurk in the system, without exciting the disease.

In the opinion of contagionists, can the clothing of a physician or friend, who visits the sick, commu-

nicate the disease to others? They have, I believe, unanimously decided this question in the negative. The same decision, I have already stated, has been made in regard to goods and inanimate objects of every kind. Actual exposure, then, to the atmosphere of the sick, is indispensable; but such exposure, it is admitted by all, will affect a very small number only.

### 7. *Animalcular Hypothesis.*

The last hypothesis which I shall mention, is the *animalcular*. To understand this, which is not a new doctrine, some acquaintance with the natural history of insects is indispensably necessary.

1. It is well known, that there are in fluids, and on many solid bodies both living and dead, a great variety of insects too small to be seen by the naked eye. They have been revealed by the microscope. Derham in his *Physico-Theology*, London, 1727, says of *animalcules*:

‘Most stagnated waters are stocked with them; new pits and ponds; yea, holes and gutters on the tops of houses and steeples.

‘It is almost impossible by reason of their perpetual motion and changing places, to count the number of animalcules, in only a drop of the green scum upon water; but I guess I have sometimes seen not fewer than one hundred frisking about in a drop no bigger than a pin’s head. But in such a drop of pepper water, a far greater number, these being much less than those.’

Baker, in his work on the microscope,\* observes:

‘It is common, in summer-time, for the water that stands in ditches to appear sometimes of a greenish and sometimes of a reddish color, which, upon examination with the microscope, is found entirely owing to infinite millions of *animalcules* crowded together on the surface of it, and giving it such appearance.

‘The water that drains from dunghills, and looks of a deep brown color, is so thronged with *animalcules*, that it seems to be all alive; and must be diluted with water before they can be sufficiently separated to distinguish their various kinds.’

Finally, he remarks:

‘The waters every where abound with life, and are an endless subject of employment for the microscope: seas, rivers, ponds, ditches, and almost every puddle, can by its assistance present us with living wonders never before discovered.’

2. By an admissible analogy, we may infer, that the air, equally with the waters, is peopled with these minute beings. We are, indeed, accustomed to see flying insects, in vast multitudes, that are visible to the naked eye, only in a strong light and under certain aspects; and it is quite obvious, that flying *animalcules* may reside in the atmosphere, undiscoverable by magnifying glasses, as such instruments are not adapted to observations on the air.

\* London, 1764.

3. Baker, in the work just quoted, has recorded a number of observations, which go to confirm this conclusion. The following extract, although rather long, will perhaps be read with interest, especially by those who know that the author was a man of science, and a distinguished member of the Royal Society.

‘The smallest living creatures yet known are the animalcules in fluids; whereof many kinds have been discovered by the microscope, of such exceeding minuteness, that a million of them would not equal the bigness of a large grain of sand; and it is probable, there may be numberless species of a size much less than these. It is also likely, that there are as many, or even more kinds of these *invisibles*, (if I may use the term,) than of those whose size is discernable by the naked eye. Here, therefore, is abundance of scope for inquiry and admiration; since every drop of water, or other liquor, (excepting oils and spirits,) either does already, or, upon standing exposed a few days, will appear full of *living creatures*, of various sizes and forms. Some kinds of these *animalcules* seem to be really fish, and are natural inhabitants of the water all their lives; others live there but occasionally, in the manner of gnats, which, from eggs dropped by their parents in the water, become swimming animals; but, after a while, shed their skins, appear in a form that bears no resemblance to what they were before, take wing, and turn creatures of the air.



‘We may thus account how water wherein *pepper, hay, oats, wheat, or other vegetable substances* are infused, will soon become full of life; for those *minute and invisible little flies*, which are every where hovering in the air, and seeking places to deposit their eggs, when a fluid offers well stored with proper nourishment for their future offspring, may be supposed to resort to it in swarms, and lay their eggs there. These eggs being soon hatched, the infant brood swim about and live happily in the fluid; till, grown to their stated size, they in due time change their forms, employ their wings and fly away.

‘The truth of this I have often experienced; for after observing some kinds of *animalcules* in several fluids to be grown to a certain bigness, on a sudden I have found them all gone away, and only a much smaller, and consequently a younger race of the same kinds remaining; which, also, when grown to a like size, have soon after in the same manner been gone too. *Besides, if the infusion be covered, though with a muslin or fine lawn, I have constantly found that few animalcules will be produced therein; but upon taking off the cover, in a few days it will be full of life; which seems to prove, that the eggs whence these animalcules come, must either be deposited by their own parents, as I above suppose, or be brought along with the air. And, indeed, both these ways may possibly be; for as the eggs of such minute creatures are lighter than air, millions of them may con-*

tinually float therein, and, being wafted every where indifferently, may perish in places unsuitable to their nature, but hatch and thrive when they happen to be lodged in a proper *nidus* for them. Some people imagine, that the eggs of these little creatures are lodged in the pepper, hay, or whatever else is put into the water; but, were it so, I cannot think a thin covering of lawn, which does not exclude the finer part of the air, would prevent their being hatched; and therefore must conclude it a mistake.

‘Though water that stands at rest, and exposed in the open air, will, after a few days, have some animalcules in it, they will be found in no degree so numerous as when vegetable bodies have been steeped therein; for no creatures seem able to subsist on mere water only, and what little particles besides may accidentally happen in it can maintain no great number. But when, by infusion of the above mentioned substances, water is stored with their proper food, the miseroscope can show myriads of *living creatures* in every little drop.’

It is not in warm weather only, that our ingenious philosopher found vegetable effusions to become impregnated with animalcules. The same happened in the ‘midst of winter, if the water was not frozen,’ but not so speedily.

4. The smallest flying insects, which we observe by the naked eye, are gnats; these belong to the genus *CULEX* of the entomologists. The *musquito*, in

some systems is referred to the same family. Let us dwell, for a moment, on the character of the *Culices*. They deposit their eggs in stagnant or eddy to water. A single gnat has been observed to discharge from 250 to 300;\* these are hatched out, and the larvæ they produce swim for a time, and then acquiring wings, rise into the air. They, as well as the mosquito, have an armed proboscis, by means of which they puncture the skin, and draw out the blood of the animals on which they subsist. The instinct of these minute insects, directs them, then, to wet places, for the purpose of depositing their eggs, and to man and animals, as affording them sustenance. The number of individuals belonging to a species, is innumerable, and the generations rapidly succeed each other; they delight in a humid atmosphere, fly abroad chiefly in the evening, and can maintain themselves against a considerable breeze. Now, is it unreasonable to conjecture, that there are many of this tribe, invisible to the naked eye, that have the same instincts, habits, and modes of propagation, with the visible species? And may they not deposit their eggs in vegetable infusions, such as were prepared and examined by Baker? It is a law of the animal kingdom, that the smaller the individuals of a species, the more numerous; we may conclude, then, that if there are invisible ærial insects, the number of individuals may exceed all human computation.

\* Kirby and Spence's Entomology.

5. Gnats and other small flying insects, whose bite is poisonous, abound both in hot and cold climates.

‘One would at first imagine that regions where the polar winter extends its icy reign would not be much annoyed by insects; but however probable the supposition, it is the reverse of fact, for nowhere are gnats more numerous. These animals, as well as the *tipulidæ*, seem endowed with the privilege of resisting any degree of cold, and of bearing any degree of heat. In Lapland their numbers are so prodigious as to be compared to a flight of snow when the flakes fall thickest, or to the dust of the earth. The natives cannot take a mouthful of food, or lie down to sleep in their cabins, unless they be fumigated almost to suffocation. In the air you cannot draw your breath without having your mouth and nostrils filled with them; and unguents of tar, fish-grease or cream, or nets steeped in fetid birch-oil, are scarcely sufficient to protect even the case-hardened cuticle of the Laplander from their bite. In certain districts of France, the accurate Reaumur informs us that he has seen people whose arms and legs have become quite monstrous from wounds inflicted by gnats; and in some cases in such a state as to render it doubtful whether amputation would not be necessary. In the neighborhood of the Crimea, the Russian soldiers are obliged to sleep in sacks to defend themselves from the mosquitos; and even this is not a sufficient security, for several of them die in consequence of mortification produced by the

bites of these furious blood-suckers. This fact is related by Dr Clarke, and to its probability his own painful experience enabled him to speak. He informs us that the bodies of himself and his companions, in spite of gloves, clothes, and handkerchiefs, were rendered one entire wound, and the consequent excessive irritation and swelling excited a considerable degree of fever. In a most sultry night, when not a breath of air was stirring, exhausted by fatigue, pain, and heat, he sought shelter in his carriage; and though almost suffocated, could not venture to open a window for fear of the musquitos. Swarms nevertheless found their way into his hiding place; and, in spite of the handkerchiefs with which he had bound up his head, filled his mouth, nostrils, and ears. In the midst of his torment he succeeded in lighting a lamp, which was extinguished in a moment by such a prodigious number of these insects, that their carcasses actually filled the glass chimney, and formed a large conical heap over the burner. The noise they make in flying cannot be conceived by persons who have only heard gnats in England. It is to all that hear it a most fearful sound. Travellers and mariners who have visited warmer climates give a similar account of the torments there inflicted by these little demons. One traveller in Africa complains that after a fifty miles' journey they would not suffer him to rest, and that his face and hands appeared, from their bites, as if he was infected with the small-pox in its worst stage.

In the East, at Batavia, Dr Arnold, a most attentive and accurate observer, relates that their bite is the most venomous he ever felt, occasioning a most intolerable itching, which lasts several days. The sight or sound of a single one either prevented him from going to bed for a whole night, or obliged him to rise many times. This species, which I have examined, is distinct from the common gnat, and appears to be nondescript.

‘From Humboldt also we learn that “between the little harbor of Higuerote and the mouth of the Rio Unare the wretched inhabitants are accustomed to stretch themselves on the ground, and pass the night buried in the sand three or four inches deep, leaving out the head only, which they cover with a handkerchief.” This illustrious traveller has given an account in detail of these insect plagues, by which it appears that amongst them there are diurnal, crepuscular, and nocturnal species, or genera: *Musquitos* or *Simulia* flying in the day; the *Temporaneros*, probably a kind of *Culex*, flying during twilight; and the *Zancudos* or *Culices* in the night. So that there is no rest for the inhabitants from their torment day or night, except for a short interval between the retreat of one species and the attack of another. We learn from this author that the sting or bite of the *Simulium* is as bad as that of the *Stomoxys* before noticed.

‘It is not therefore incredible that Sapor, king of Persia, as is related, should have been compelled to raise the siege of Nisibis by a plague of gnats, which

attacking his elephants and beasts of burthen, so caused the rout of his army, whatever we may think of the miracle to which it was attributed; nor that the inhabitants of various cities, as Mouffet has collected from different authors, should, by any extraordinary multiplication of this plague, have been compelled to desert them; or that by their power to do mischief, like other conquerors who have been the torment of the human race, they should have attained to fame, and have given their name to bays, towns, and even to considerable territories.\*

Now may we not be permitted to conjecture, that species invisible to the naked eye, are also poisonous? The number of reptiles and insects, which secrete a venomous fluid, as a means of defence, is really very great, and the disease produced by the venom of some of the former, as the rattle-snake, for example, bears a striking resemblance to Epidemic Cholera.

6. Certain *Culices*, as the musquito, extend themselves up and down rivers, from warmer to colder climates. Thus, the insect just named ascends the Mississippi and Ohio, as the hot weather comes on. May not microscopic species of the same family, follow the same law, and thus, at times, disseminate themselves into regions very remote from those in which they were indigenous?

7. But insects are dispersed over the earth in other modes. The winds may carry them when they do not

\* Kirby and Spence.

make resistance, and even when they do; if the current be strong. Many insects, moreover, attach themselves peculiarly to man, especially when he lives in poverty and filth, or is enfeebled by disease; and may not this be the case with species that are invisible?

Let us apply these facts to the history of Epidemic Cholera.

We assume the existence of malaria, of mineral exhalations, of meteoration, of contagion; let us, in like manner, assume the existence of poisonous, invisible, ærial insects, of the same or similar habits with the gnat; let us assume still further, what will scarcely be denied, that these insects have instincts, which may direct their migrations, their search after food, and their choice of situations; and that they are liable to be carried by high winds into elevated and dry places, which they would not frequent from choice; finally, let us suppose that some cause has augmented indefinitely the number of individuals of some species, and we shall then have all the theory which is necessary to explain most of the facts connected with our Epidemic. This hypothesis would account for the greater prevalence of the disease in hot than cold countries, on the banks of rivers and near their mouths, over marshy grounds, about marine harbors, and in other humid situations, than under opposite circumstances, because there the enemy must multiply most. It also accounts for the connexion of the disease, with wet, filthy, and de-



composing vegetable substances; as, in such matters, according to Reaumur and Baker, *animalcules* appear in countless multitudes. The doctrine likewise explains the simultaneous breaking out of the disease in various parts of the same country; its sudden invasion, short duration, and rapid decline; its occasionally keeping on one side of a river, although the inhabitants of both, perpetually cross and recross; its affecting one part of a town only; its extreme mortality in one wing of an army, while the other, encamped in a locality a little different, remained healthy; its appearance and disappearance from a body of marching troops, two or three times in succession, as they passed over different kinds of soil; its leaving many places untouched; its returning upon others, and ravaging them anew; its occasionally visiting dry, elevated, and salubrious situations, to which they might be carried by the winds on their flight; and, perhaps, the fact of its not having crossed the arid deserts of Arabia into Africa. The doctrine still further explains, why exposure to a damp, and especially the evening air, has been found so productive of the disease—as the *animalculæ*, may, from analogy, be presumed to be then most abroad; why so many persons are attacked in the latter part of the night, particularly if exposed to the atmosphere of the evening; why a night breeze from the shore, in hot countries, blowing upon a vessel lying near, has sometimes been followed, in a few hours, by malignant cholera, in a great number of those ex-

posed to it;\* why persons residing in low, damp, filthy, and ill ventilated places, are more affected than others—for in such situations the insects would multiply rapidly, and no cause would operate to disperse them; why some persons are more liable to the disease than others—as we find the larger insects, more disposed to prey on some individuals than others; why persons enfeebled in constitution are oftenest its victims—as other insects and vermin are constantly prone to select such as their prey; why masses of forest have sometimes seemed to be a protection—for many insects delight to gather about green trees; why the disease does not entirely cease, during winter, though it is generally mitigated; why it spreads, as the French Academy of Medicine expresses it, capriciously, that is, accordingly to animal instinct; why it has often seemed to be imported when, in fact, it is not contagious—the animalcules might swarm and multiply in the hold of a vessel, and escaping when it reached the destined port, and depositing their *ova* in the water, might speedily reinforce themselves, and originate the malady; or during the voyage, might issue from beneath the decks, and infect the crew; why individuals going into healthy situations, and sickening with the disease, do not communicate it; why those who attend on patients where it is epidemic, are not oftener affected than others; why caravans have often appeared to introduce the disease into places—as the *animalcules* might adhere to,

\* Johnson on Tropical Diseases.

and travel with them, as is often the case with larger insects; finally, why quarantines are not to be relied on, and military cordons have proved entirely useless—as the enemy, on his own or the wings of the wind, might pass on unseen and unobstructed. It is in favor of this hypothesis, that it calls for all the precautions that experience has shown to be necessary; the avoidance of every thing that produces debility; the removal of nuisances; the drying up of wet places; free ventilation; and seclusion from the evening and night air; to which end, the experiments of Baker, on the influence of gauze covers, in excluding *animalcules* from vessels containing vegetable infusions, would suggest for our windows, at night, the screens which Lancisi informs us have been found efficacious in preventing intermittents, in Italy.

As to the manner in which the supposed ærial *animalculæ* might act on, or enter the human body, it may be the same, as that in which contagion, or malaria—admitting its existence—exerts itself. The *ova* of such insects may even be deposited and float in the air, to fall into water and be hatched out, as the seeds of many of the more imperfect plants, such as the *fungus*, the *lycorperdon*, and *mucor*, are disseminated; and these *ova*, as well as the perfect insects, may be inhaled or swallowed, and adhere to the mucuous membrane, or perhaps be absorbed into the blood, or both; or, the *ova*, being deposited in the waters, may be swallowed, and the insects developed in our bodies.

Such is the application that may be made of the animalcular doctrine, to the history of the Epidemic Cholera. I am far from avowing my belief in its reality, but am disposed to think, that it explains more of the facts, than either of the hypotheses. This, however, does not establish its truth. A theory to be true, must explain *all* the facts, and be the only one that can. But, although the animalcular be a mere hypothesis, it may be useful to science to assert its claims. There are too many members of the profession, and of society at large, who allow themselves to adopt and dogmatically maintain some one of the other hypotheses, which have been enumerated; and it may, possibly, excite doubts and refresh the spirit of inquiry, for such philosophers to be shown, that a doctrine, which they might have regarded as altogether fanciful, will, in reality, explain many points in the history of the Epidemic, quite as successfully as the system to which they yield an implicit assent.

Let us turn from the fruitless pursuit of a principal and universal remote cause of Epidemic Cholera, to the more profitable study of auxiliary causes. These, in theory, may be referred to two divisions; first, such as favor the generation or exalt the activity of the specific remote cause; and, secondly, such as predispose the body to its action, or quicken it into life. Every auxiliary cause must act in one of these two modes; but, after having established the classes, it may be difficult to assort the agents, which are to be

distributed. Which of them, for example, should be referred to the first? None, I should presume, but heat, moisture, decomposable matter, and confined air. These conditions are favorable to the generation of malaria and animalcular insects, and are calculated both to condense and disseminate contagion. Where they have existed in the highest degree, the Epidemic, other circumstances being equal, has prevailed with the greatest mortality. It has, however, occurred in temperate weather, and in dry places, which were cleanly and well ventilated; and, therefore, it *has* a cause, distinct from these or any, perhaps, that could be thus generated, the opinion of some writers to the contrary, notwithstanding. The circumstances which predispose the body to the action of that agent, whatever it may be, and are, therefore, referable to the second division, are, exhaustion from age, chronic infirmities, and innutritious diet; intemperance in the use of ardent spirits; long-continued exertion; confined lodgings; the habitual breathing of an impure air; exposure to the damp and cool atmosphere of the night, after the intense heat of the day; irregular and excessive indulgence in food; apprehension of the disease; grief from the loss of friends; finally, constitutional temperament or native predisposition. The influence of these circumstances is so great, that those who are under several, or even one of them, are in great danger of being seized when the disease prevails; but it may occur in persons who are exempt from the operation

of the whole, except the last, and there *is*, therefore, a cause distinct from them all, and their agency is limited to the effect of predisposing the system to its action.

If such a cause does *not* exist, why is the world now trembling at the geographical progress of an Epidemic, as uniform in its symptoms as small pox, and as fatal in its termination as the plague? The existence of such a cause must, I think, be admitted. Whether it will ever be discovered is extremely doubtful. Meanwhile, philanthropy and science should exert themselves in correcting or removing all the conditions that co-operate with it in the work of human destruction, and thus disarm, if they cannot slay the monster.

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## CHAPTER III.

### SYMPTOMS OF THE DISEASE.

WE come at length to matters of deeper interest than most of what has occupied us in the preceding chapters. To record all the symptoms which have manifested themselves, as the disease has passed through innumerable localities and invaded many distinct nations, would require a volume; and could prove of no great utility, at a moment when a practical hand-book is required. I shall not attempt it; but select such descriptions, as will, in the briefest

manner compatible with an accurate knowledge of its symptomatology, present its aspect in several different places, and in its various stages, and grades of violence.

### *1. Of the first or forming Stage.*

The British practitioners in India have not overlooked this important period of the disease; important, because it is that in which it can be most successfully arrested.

Mr. Orton, one of the best of the Indian writers on Cholera, observes:

‘The attack of Cholera is usually sudden and violent, but in a great majority of instances, not without some premonitory symptoms; it is frequently preceded by a simple diarrhœa, continuing several days, and still more commonly by other slight affections which are more characteristic of the disease; an extraordinary depression of spirits and general uneasiness come on, attended by tremor, and sense of debility; giddiness or head-ache, and occasionally ringing in the ears, are also felt, particularly on rising from the recumbent posture, or making any sudden movement. Pains, resembling those which attend the accession of fever, are frequently felt in the limbs; the bowels are griped occasionally, and natural loose stools occur; and nausea come on. The circulation and temperature of the body are variously disturbed, but most commonly, the pulse is accelerated and weakened; the skin is moist, and colder than

usual, to the hand of another. These symptoms, or some of them, not unfrequently continue many hours, or even a day or two, without proceeding much farther, or exciting much attention.'

The Madras Medical Board holds the following language:

'This most formidable disease does not appear to be attended by any premonitory symptoms which can be regarded as being at all peculiar to it; on the contrary, we may safely assert, that it is of sudden invasion; for, though a slight nausea, a laxity of the bowels, and a general feeling of indisposition are often found to precede Cholera, yet these symptoms are evidently common to many acute diseases; and they are especially frequent in this climate without being followed by any graver ailment. When such symptoms are found to precede Cholera, they might with more truth be regarded as indicating merely a certain deranged state of the alimentary organs, a condition of the body which certainly predisposes a person to an attack of Cholera.'

The French Academicians say, in their report to the government:

'In India as in Russia, it has been remarked that persons who escaped the Cholera, though in the midst of the Epidemic, experienced, nevertheless, the epidemic influence, which betrayed its presence to the invaded populace, by uneasiness, vertigo, syncope, anorexia, flatulency, constipation or diarrhœa.'

Dr Perron, one of the Commission of the French



government to Russia, gives the annexed account of this initiatory state, as observed on the continent of Europe.

‘We may admit of three stages in this plague. The first is that of its inferior degree, of its imperfect development, or only of the *precursors*. The second embraces its ordinary development. And the third comprehends cases in which the most alarming symptoms of the former stage acquire the greatest degree of intensity. The first period is, unfortunately, too often neglected, at the great peril of the patient, because the symptoms are not then sufficiently alarming to give uneasiness; they are not even considered as belonging to Cholera, but as the consequence of a simple gastric affection. The symptoms belonging to this first stage, are, a sensation of uneasiness, either with or without pain in the pit of the stomach, the want or loss of appetite, a great heaviness in the lower part of the abdomen, with a disposition to diarrhœa, or a diarrhœa partly developed, and which may precede the attack for some time; afterwards some nausea, and even sometimes slight vomiting, and weakness in the limbs, headache, alternate shivering and slight heat. These symptoms are not always united; sometimes one, and sometimes the other, predominates. During the Epidemic, they are found more or less in every body; they last several days, disappear and return, and often have no other effect. They must then be regarded as an imperfect development of the disease.’

But the fullest account of these ailments which may be regarded as the offspring of the remote cause of Cholera, and, indeed, of the first or forming stage of that malady, is given us by Mr Greenhow, (London, 1832,) who observed the late invasion at New Castle, England. Speaking of the stage of collapse or prostration, he remarks:

‘ It may occur suddenly, without previous warning or appreciable disposition, and at once arrest the functions of life, terminating fatally with fearful rapidity. But for the most part it may be considered as a second, rather than a first, stage of disease, being very generally preceded by a train of symptoms, which, if attended to, give timely notice of approach. These consist of diarrhœa, often for many days, and general failure of the digestive powers; not unfrequently of head-ache, pain at the scrobiculus cordis, or some part of the abdomen, and preternatural vascular action. It has sometimes happened that this increased action of the vascular system has given to the patient a feeling of unusual good health, and a greater excitement of animal spirits than was usual to him. In other cases, and more frequently the patient feels languid, weary, and oppressed before the attack, with a general feeling of undefined indisposition. The first discharges from the stomach often consist of unaltered ingesta of the last twenty-four hours, showing the failure of the digestive action during that period; and the alvine evacuations consist, at first, of the feculent and bilious contents of the in-

testines, which are presently succeeded by serous or rice water discharges peculiar to the disease.'

The distinguished editor of the *Medico-Chirurgical Review*, January, 1832, observes:

'We believe it is a fact, established beyond all doubt, that, ever since the month of May last, a disposition to gastric irritation and bowel complaints has obtained, in a degree infinitely exceeding that of any former year for a considerable period. This gastro-intestinal irritability has not been confined to the lower classes of society, but has prevailed among all classes.'

Mr Fife, of New Castle, thinks the characteristic of diarrhœa cholERICA is not to be found in the suddenness or slowness of the attacks, but the profuse discharges resembling rice water. He has observed them always to precede the stage of collapse. After they have existed for some time, he has found the blood remarkably deficient in serum.

In a letter, published in the same work, for April, 1832, from Dr Ogden, of Sunderland, we have the following paragraph:

'During the prevalence of Cholera, there are observed among persons otherwise healthy, various anomalous affections of the nervous system, as spasms and cold sensations of the hands, feet, and legs, peculiar thrilling sensations of the extremities of the fingers and toes, and a feeling of great anxiety in the præcordial region.'

Dr Bronson, of Albany, in a letter from Montreal, makes these remarks:

‘It has been remarked, whenever Cholera has appeared, in both continents, that the whole population within the sphere of its rage, have experienced some of the symptoms which are usually premonitory of its attack, such as griping pains, or oppression at the stomach, depraved digestion, &c. This I have noticed in all the regions where Cholera has prevailed, from Whitehall to this place. I have supposed these sensations to be independent of anxiety or fear, because I have found them where they could not have been supposed to exist.’

Dr Rhineland, on his return to the city of New York, from Quebec, in speaking of the disease in Canada, declares:

‘Every person in those Provinces was affected by the same premonitory symptoms, viz. pain in the region of the stomach, a burning sensation in the bowels, and a fulness or expansion of the abdomen. These feelings were universal, and I may safely say not one person escaped them.’

Such in Asia, Europe, and America, are the first symptoms of Epidemic Cholera. In multitudes, the disease does not advance beyond this grade. These symptoms, I have said, in the first chapter, are more common in Europe than Asia. Many of them, particularly the nervous affections described by Dr Ogden, are, no doubt, originated or heightened by fear. Even diarrhœa, may be the effect of that

passion. Still, they sufficiently indicate an unhealthy state of the atmosphere, the presence in it of the remote cause, and the action of that remote cause on the constitution, though in a less degree, than that which produces fatal prostration.

Since the first week of June, there has been, in Cincinnati, an extraordinary prevalence of bowel complaints, especially among adults. Few, comparatively, have been confined; but some cases, I am told, have proved fatal. In some instances, the malady has inclined to dysentery; in others, to open cholera morbus; but in a vast majority, it has been, and is, a state of intestinal irritation, attended with painful diarrhœa and general lassitude. In this affection, I have observed an unusual degree of obstinacy, and a great disposition to recur. It is worthy of being recorded, that these affections began nearly at the same time with the Cholera of the St Lawrence; about the 8th or 10th of June. Even at that early period, I witnessed a case, which, from the severity of the vomiting, the epigastric pain, the great reduction of temperature, and the cramps and spasms of the muscles, would have passed for a violent attack of Epidemic Cholera, had the disease then been prevalent among us. Another case deserves to be mentioned. A gentleman was attacked, spontaneously, that is, without any known cause, with pain in the pit of the stomach and diarrhœa, with considerable fever. The immediate loss of a pint of blood, and the use of a pill of cal-

omel and opium, arrested the disease; but on the same night, he awoke with *cramp in one of his legs*, an affection which had never before attacked him in his sleep. At this time, July 8th, diarrhœa and cholera morbus are increasing throughout the city. I was called this morning, to visit a family, every member of which, four in number, had been seized in a single hour with cholera. They had breakfasted in the simplest manner. In the endemic cholera of Cincinnati, in common years, a *copious secretion of bile* is a prominent symptom; but at the present time, the matters ejected are, in almost every case, devoid of that secretion; and consist of a turbid watery fluid, which is sometimes in great quantities. On the whole, it is quite obvious that the precursory disorders of the Epidemic already prevail among us.

*Stage of Prostration, Asphyxia, or Collapse.*

The stage which has just been described, may occur in various degrees of intensity and duration, from a slight indisposition, to a pretty severe but not dangerous affection; and from a single hour to many days. Should it not terminate in health spontaneously, or under medical treatment, it passes on to what may be called the second stage; but which, in many cases, especially in Asia, is the first. I shall borrow from the report of the Madras Medical Board, a lengthened and circumstantial history of this stage and its termination, either in health, or the state of febrile reaction, presently to be described.

‘The invasion of Cholera generally takes place in the night, or towards morning. The patient is sick at stomach, he vomits its contents, and his bowels are at the same time evacuated. This evacuation is of a nature quite peculiar to the disease; the entire intestinal tube seems to be at once emptied of its fœcal or solid matters; and an indescribable, but most subduing feeling of exhaustion, sinking, and emptiness is produced. Faintness supervenes, the skin becomes cold, and there is frequently giddiness, and ringing in the ears: the powers of locomotion are generally soon arrested; spasmodic contractions, or twitchings of the muscles of the fingers and toes are felt; and these affections gradually extend along the limbs, to the trunk of the body; they partake both of the clonic and tonic spasm, but the clonic form chiefly prevails. The pulse, from the first, is small, weak, and accelerated; and after a certain interval, but especially on the accession of spasms, or of severe vomiting, it sinks suddenly, so as to be speedily lost in all the external parts. The skin, which from the commencement of the disease, is below the natural temperature, becomes colder and colder; it is very rarely dry; generally covered with a profuse cold sweat, or with a clammy moisture. In Europeans it often partially assumes a livid hue; the whole surface appears collapsed, the lips become blue, the nails present a similar tint, and the skin of the feet and hands become much corrugated, and exhibits a sodden ap-



pearance: in this state the skin is insensible even to the action of chemical agents; yet the patient generally complains of oppressive heat on the surface, and wishes to throw off the bed clothes; the eyes sink in their orbits, and are surrounded by a livid circle; the corneæ become flaccid, the conjunctiva frequently suffused with blood; the features of the face collapse; and the whole countenance assumes a cadaverous aspect, strikingly characteristic of the disease. There is almost always urgent thirst, and desire for cold drink, although the mouth be not usually parched. The tongue is moist, whitish, and cold. A distressing sense of pain, and of burning heat at the epigastrium are common; little or no urine, bile, or saliva is secreted; the voice becomes feeble, hollow, and unnatural; the respiration is oppressed, generally slow; and the breath is deficient in heat.

‘During the progress of these symptoms, the alimentary canal is very variously affected. After the first discharges by vomiting and purging, however severe these symptoms may be, the matter evacuated is always watery; and in a great proportion of cases, it is colorless, inodorous, and often homogeneous. In some, it is turbid, resembling muddy water; in others, it is of a yellowish or greenish hue. A very common appearance is that which has been emphatically called the ‘congee stools,’ an appearance produced by numerous mucous flakes, floating in the colorless watery or serous part of



the evacuation. The discharges from the stomach and those from the bowels, do not appear to differ, except in the former being mixed with the ingesta. Neither the vomiting nor the purging are symptoms of long continuance; they are either obviated by art, or the body becomes unable to perform those violent actions; and they, together with the spasms, generally disappear a considerable time before death. If blood be drawn, it is always dark, or almost black; ropy, and generally of slow and difficult effusion. Towards the close of the attack, jactation comes on, with evident internal anxiety, and distress; and death takes place, often in ten or twelve, generally within eighteen or twenty hours from the commencement of the attack.

‘During all this mortal struggle and commotion in the body, the mind remains clear, and its functions undisturbed, almost to the last moment of existence. The patient, though sunk and overwhelmed, listless, averse to speak, and impatient of disturbance, still retains the power of thinking, and of expressing his thoughts, as long as his organs are obedient to his will. Such is the most ordinary course of Cholera asphyxia, when its tendency to death is not checked by art.

‘Cholera, like other diseases, has presented considerable variety in the symptoms. Thus, when the disease appears epidemically, it may on one occasion be distinguished throughout by the absence of vomiting, and by the prevalence of purging; on another,

by the excess of vomiting; and, though more rarely, by the absence of purging. Spasm, may be generally present in one instance of invasion; in another, it may be distinguishable. A frequent variety, the worst of all, is, that which is noted for the very slight commotion in the system; in which there is no vomiting; hardly any purging, perhaps one or two loose stools; no perceptible spasm, no pain of any kind; a mortal coldness, with arrest of the circulation, comes on from the beginning, and the patient dies without a struggle.

‘Vomiting is sometimes altogether absent, or if it has been present, soon ceases from an atonic state of the stomach; under which that organ receives and retains whatever may be poured into it, as if it were really a dead substance.

‘Purging, is a more constant symptom of Cholera, than vomiting; and, in a large majority of cases, it is the first in order of occurrence; but being a less striking deviation from a state of health than vomiting, which instantly arrests the attention, it has usually been treated of in succession to it; this symptom has very rarely been altogether absent; its absence appears indeed to denote a peculiar degree of malignancy in the attack. There is seldom much griping or tenesmus, although the calls are very sudden and irresistible. They also, sometimes, take place simultaneously with vomiting, spasm, and stoppage of the pulse; as if all these affections originated at the instant from one common cause. In

advanced stages of the disease, purging generally ceases; but in many cases, a flow of watery fluid from the rectum takes place, on any change of position. The matters evacuated after the first emptying of the bowels, have been occasionally observed to be greenish or yellowish, turbid, of a frothy appearance, like yeast, and sometimes bloody; but by far the most common appearance is, that of pure serum, so thin and colorless as not to leave a stain on the patient's linen. The next in order of frequency is the conjee-like fluid; the mucus is, at times, so thoroughly mixed, however, with serum, as to give the whole the appearance of milk or chyle; the evacuations have also been noticed to resemble soojee, in color and consistence, and these cases were mild. The quantity of the clear watery fluid, which is sometimes discharged, is exceedingly great; and, were it uniform, it might afford us an easy solution of the debility, thirst, thickness of blood, and other symptoms; but it is unquestionable, that the most fatal and rapid cases, are by no means those which are distinguished by excessive discharges. We have innumerable instances, on the contrary, of death ensuing after one or two watery stools, without the development of any other symptom affecting the natural functions. Even collapse has come on, before any evacuation by stool had taken place.

‘Of the animal functions, the undisturbed state of the mind, has been the subject of general remark; but it cannot be matter of surprise should some ex-

ceptions occur, from a fortuitous morbid affection of the brain, following a state of sanguineous congestion. Instances are not wanting, of patients being able to walk, and to perform many of their usual avocations, even after the circulation has been so much arrested, that the pulse has not been discernable at the wrist: the cases here alluded to, are those chiefly, in which it has began by an insidious watery purging; and many lives have been lost in consequence of the patients, under these fallacious appearances, not taking timely alarm, and applying for medical aid. In other cases, again, the animal functions appear to have been early impaired, and the prostration of strength to have preceded most of the symptoms. The voice, in general, partakes of the debility prevailing in the other functions; and is usually noticed as being feeble, often almost inaudible. Deafness has also been remarked, in some instances, to have been completely established. Spasm has been held to be so essential a feature of that species of Cholera of which we are treating, as to confer on it a specific name; in so far, however, as relates to the muscles of voluntary motion, (and it is that description of spasm only, which we mean here to treat,) no symptom is more frequently wanting. Spasms of the muscles chiefly accompany those cases in which there is a sensible and violent commotion in the system; hence they are more frequently found in European, than in native patients, and in the robust of either, than in the weakly. In the low, and

most dangerous form of Cholera, whether in European or native cases, spasm is generally wanting, or is present in a very slight degree. The muscles most commonly affected are those of the toes and feet, and calves of the legs; next to them, the corresponding muscles of the superior extremities; then those of the thighs and arms; and lastly those of the trunk; producing various distressing sensations to the patient.

‘Of all the symptoms of Cholera, none is so invariably present, none indeed so truly essential, and diagnostic, as the immediate sinking of the circulation. It must nevertheless be admitted, that where instant remedial measures have been successfully practised, this symptom may not have developed itself; and that there are even cases where an excited vascular action has been observed to accompany the first movement of the system in Cholera. Some intelligent practitioners have entertained doubts, whether such cases belong indeed to this disease; it is, however, to be remembered, that these are precisely the cases which yield most certainly and readily to our remedial means; and it consequently follows, that a medical man can seldom have the opportunity of observing whether or not this form of Cholera will degenerate into the last stage. There is, however, direct evidence in support of the fact, that they have so degenerated, and gone on to a fatal termination. In the case of soldiers, too, in whom such symptoms

have chiefly appeared, we must make some account of the quantity of spirits usually drank by them at the commencement of the disease, producing an effect on the circulation. The period at which a marked diminution of vascular action takes place, is somewhat various; the pulse sometimes keeps up tolerably for several hours, though very rarely; it more generally becomes small, and accelerated at an early stage, and on the accession of spasm or vomiting, suddenly ceases to be distinguishable in the extremities. The length of time, during which a patient will sometimes live in a pulseless state, is extraordinary.

‘Thirst, and sense of heat, or burning in the region of the stomach, are generally connected together, and form very prominent and constant symptoms of Cholera; yet not only individuals, but even in epidemic invasions, these symptoms have often been altogether wanting. Even when they are present in the highest degree, the mouth is not often parched, nor the tongue often dry; on the contrary, there seems in general no want of moisture; and while, as Mr Jameson observes, “all is burning within,” these surfaces are cold and blanched; at times, however, the mouth is parched, and the tongue dry and furred. But practitioners seem doubtful, whether any practical inference is thence to be drawn; what would be the state of these parts, if calomel, ardent spirits, laudanum, and spices were as largely employed

in health, or in many common diseases, as in Cholera, with as scanty a use of diluents? When thirst is present, it seems to subdue all other feelings; and the ignorant soldier, as well as the medical man, who firmly believes that cold water is almost certain death, alike eagerly seek and swallow it. The state of the skin is cold, generally clammy, and often covered with profuse cold sweat. Nevertheless, varieties occur in this, as in other symptoms of Cholera; the skin is sometimes observed to be dry, though cold; and sometimes of natural, nay, in some rare instances, of preternatural warmth. An increase of temperature has been repeatedly observed to take place just before death; but the development of heat appears to be confined then to the trunk and head; and in almost all cases, this partial development of heat, is found to be a fatal symptom. It is entirely unconnected with any restoration of the energy of the arterial system, or any improvement in the function of respiration. At a very early stage in Cholera, leeches can procure little or no blood from the skin. This fact is noticed by some, in another sense, as if these animals turned in abhorrence from the skin of a person ill with Cholera. When the sweat is thin, it is usually poured out in large quantity from the whole surface of the body; but when thick, or clammy, it is more partial, and generally confined to the trunk and head. The action of the vapor and hot baths, seems unquestionably to increase the exudation, or



secretion from the skin; and the application of dry heat, as the natural temperature of the skin augments, appears to restrain these discharges.

‘That remarkable shrinking of the features of the face, which has acquired the emphatic term of the “true Cholera countenance,” appears in every case, not quickly cut short by medicine. This expression of countenance, which conveys too truly that of death itself, cannot be mistaken, and by an attentive observation it will be perceived, that a similar shrinking takes place throughout the limbs, and all the projecting parts of the body.

‘Respiration is not usually interrupted in the early stages of Cholera. In many cases terminating in death, respiration has gone on in its mechanical part, with little or no interruption, except that it becomes slower and slower. Numerous cases, on the other hand, are noticed, especially in Europeans, where the interruption of respiration was most distressing, and could only be compared with the most violent attacks of asthma. Although the breath is stated, in many of the reports, to have been deficient in heat, it is not clear that this is a general symptom, nor is it understood, that this coldness is more particularly observed in cases of difficult and laborious respiration, than in those where this function seemed to be at least mechanically performed without interruption.

‘In a disease so highly congestive as Cholera, where vertigo, deafness, and ringing in the ears of



ten prevail, and where very large quantities of opium and intoxicating matters have been swallowed, it is truly surprising that the functions of the sensorium are so very rarely disturbed. It seems probable, that it is, in many instances, from an inaccuracy of language, that coma has been represented as a symptom of Cholera.\* Coma must, however, be admitted occasionally to occur, especially towards the termination of the case, when it is fatal; but delirium has seldom or never been observed, unless as a sequela of Cholera.

‘When medical aid is early administered, and when the constitution is otherwise healthy, the recovery from an attack of cholera is so wonderfully rapid, as perhaps to be decisive, of the disease being essentially unconnected with any organic lesion. In natives of this country, especially, in whom there is ordinarily very little tendency to inflammatory action, the recovery from Cholera is generally so speedy and perfect, that it can only be compared to recovery from syncope, cholic, and diseases of a similar nature; but in Europeans, in whom there is a much greater tendency to inflammation, and to determinations of blood to some of the viscera, the recovery from Cholera is by no means so sudden, or so perfect; on the contrary, it is too often involved with affections as various as the diseases of these

\* ‘This assuredly is a mistake, a listless comatose state being a very common symptom in my experience, and of general remark.’—*Searle*.

viscera are known to be, in this climate. The most frequent of the sequelæ of Cholera, are affections of the intestines, of the brain, of the liver, and of the stomach. When Cholera, however, is of long continuance, and when the congestions appear to have been thoroughly established, few, either Europeans or natives, who outlive the attack, are restored to health without considerable difficulty. It has been already remarked, that recovery from an attack of Cholera, is indicated by the return of heat to the surface of the body, and rising of the pulse; a deceitful calm, however, sometimes attends these favorable appearances, which too often mocks our hopes and expectations. And, on the contrary, patients have been observed to remain for one, two, and even three days, in a state of the greatest collapse, and yet, contrary to all expectation, have recovered.

‘No symptoms of Cholera are so uniform in their appearance and progress, as those connected with the blood, and its circulation. It is established by undoubted evidence, that the blood of persons attacked with Cholera, is of an unnaturally dark color and thick consistence; these changes in the condition of the blood, are likewise fully proved to be in the ratio with the duration of the disease.

‘A great majority of the reports state unequivocally, that after a certain quantity of dark and thick blood has been abstracted from a patient under Cholera, it is usual for its color to become lighter, its

consistence to become less thick, and for the circulation of revive; such appearances always affording ground for proportionably favorable prognosis. In many instances, however, no such changes have been observed to accompany the operation of bleeding, while yet the result was favorable. The blood is generally found to be less changed in appearance, in those cases of Cholera which have been ushered in with symptoms of excitement, than where the collapsed state of the system has occurred at an early period. The blood has been occasionally found, on dissection, to be of as dark color in the left, as in the right side of the heart; affording reason to believe that in the whole arterial system, it was equally changed; the temporal artery having been frequently opened, the blood was found to be dark and thick, like the venous blood.

‘Amongst natives, respiration is pretty generally free, until the very last stage; and the color and consistence of the blood, in the instances where venesection has been performed, has been very uniformly stated to be dark, whether excessive discharges prevailed or not. It may thence be allowable to conclude, without any further particular evidence, that though the passage of the blood through the lungs has been free, its natural change is interrupted by Cholera.

‘It is the declared opinion of many practitioners, who have had to cope with the disease, that its tendency to death is so great, as never to be counter-

acted by the unaided efforts of nature. The same opinion is no less implied, by the observations of all, that the delay but of a few hours, places the patient beyond the reach of art; for hours are, in this disease, as days are in others; that death may be said to be the ordinary termination of Cholera. And there is, in truth, very little variety in the course which the disease pursues towards it. This has already been described, as consisting, in a general suspension of the natural, and gradual cessation of the vital functions, rather than in the establishment of morbid actions. Cases have been remarked, where the vital functions have been more suddenly overcome, and where death took place, before the usual development of the symptoms. Fatal terminations likewise occur, from topical inflammations supervening, as gastritis, enteritis, or hepatitis. The intestinal canal seems especially obnoxious to the effects of Cholera; numbers of those attacked with it, having subsequently been seized with dysentery.'

To many, this copious Asiatic account may seem quite sufficient; but, as the people of the United States bear more resemblance, in constitution and moral character, to those of Europe than Asia, it will be proper to give an account of the symptoms of the Epidemic, as observed in the former.

Mr Hamett, a British naval surgeon,—one of the Medical Board deputed by the government to visit the continent and observe the disease, and who

saw it raging in Danzig, Prussia,—writes concerning the stage now under consideration, in the following words:\*

‘In most rapid and severe cases of fatal Cholera, the patient was suddenly seized with sickness or pain at stomach, occasional pain, or feeling of weight and uneasiness in the hypochondria, the right hypochondrium especially; giddiness, prostration, great thirst and craving for cold drinks, a cold sweat that quickly became colliquative and clammy; at times coldness alone, at others coldness and dampishness of the body, but never with shivering; the pulse was frequent but not hard, and soon became exceedingly reduced; the hands and features somewhat shrunk; the tongue was foul, unnaturally moist, and occasionally tremulous; the voice subdued; the eyes heavy and suffused, and the sight dim. These primary symptoms were in general either accompanied, or immediately followed, by retching and vomiting, and a peculiar watery diarrhœa, which often, however, proved irregular in the order of attack, occasionally even with respect to each other, and oftentimes severe, in hot, close, and electrical weather especially; griping pains in the abdomen; painful contraction of the muscles at the umbilicus; suppression of the secretion of urine, and occasional pain in the region of the bladder. Cramps in general followed the retching and vomiting, and in most instances in-

\* *Medico-Chirurgical Review*, January, 1832.

vaded the calves of the legs at first; in their attacks of other parts of the extremities, they proved irregular, seizing first the fore-arms, calves and fore-arms, hand and fingers, toes and feet, or hands, feet, and calves, in different instances indiscriminately; occasionally they mounted up the thighs, but seldom attacked the trunk. Men rarely escaped them, women frequently, and children generally.

‘The vomited matter in general consisted of undigested food at first, sometimes partially tinged with yellowish green; of fluid ingesta, also occasionally imbued with greenish colored matter, and partly of slime and mucus. Often, however, it consisted of undigested food, or of fluid ingesta alone, without being in any wise so imbued. In the retching and vomiting which followed, the fluids taken continued to be rejected with a little greenish colored matter, with or without more slime or mucus. The dejections were always watery; sometimes as if colored with feculent matter; in general they were either colorless, somewhat like whey, or had the appearance of rice water, barley water, occasionally somewhat dirty, or with an avanaceous sediment, after being shaken in water.

‘After this first advance of the disease, the following symptoms rapidly supervened; viz. increasing oppression at the heart, and short, hurried, and laborious breathing, ending in complete oppression and weight at the *præcordia*; tossing of the head about; anxious restlessness depicted, often with terror, in

the countenance, which in general was of a dark brown, wan, or leaden hue, according to the complexion; insatiable thirst, with incessant craving for cold drinks, and the voice raucous and depressed. The retching and vomiting, and diarrhœa, with occasional *tormina* and cramps, at first only intermitting at short intervals, subsided either abruptly or gradually as vital exhaustion advanced; the pulse at the wrist, if not extinct—which it was in most rapid and severe instances—was accelerated to the utmost in frequency, and barely felt; the surface of the body quite cold, damp, and clammy, and the feet and insteps marked with bluish streaks and patches; the tongue cool or cold, and in some instances livid at the tip and edges; breath cool or cold; lips blue; nose sometimes bluish; voice below the breath, or gone; cheeks and eyes now quite sunk; pupils at times partly or completely dilated; eyelids half closed, and encircled with livid rings; the parts of the conjunctivæ exposed being much the same in appearance as after death. Amid this complicated suffering, the patient was not insensible until just before dissolution, which ensued after some faint convulsive sobs, generally within from eighteen to seventy-two, and occasionally within from eight to eighteen hours after the first attack.'

England seems to have produced some considerable modification of the disease, but the limits of this work will not admit of details on this point. A writer in the *Medico-Chirurgical Review*, for April, 1832, gives the following summary of its symptoms:



‘The Cholera in England has maintained a striking resemblance to the oft repeated descriptions of its symptoms in other countries. Thus, the severe vomiting and purging of peculiar characteristic secretions; the nausea, internal burning at the epigastrium, intolerable weight, anguish, and oppression; the paroxysms of severe pain commencing at the stomach, and rapidly extending over the whole alimentary canal; the ardent thirst; the cramps; the deadly prostration, anxiety, and dejection; the conscious feeling of the hand of death; the failing of the circulation and animal heat; the peculiar cold sweat; shrinking of the skin and subjacent tissues; sharpening of the features; contraction of the fingers, and prominence of the tendons; the hollow, sunken eye; the leaden aspect of the surface, particularly visible in the hands, feet, nails, lips, and the circles around the mouth and eyes; the black, thick blood, often not to be obtained; the difficult and slow respiration; cold breath and tongue; the whispering voice, and if death comes not in this shape, the fever rapidly coming on, often takes the last stage of typhus. The sudden invasion, speedy death, or, as rapid recovery, have all been witnessed in England, as well as in the north of Russia, and on the banks of the Ganges.

‘But this alarming catalogue, drawn up from the the whole, presents no current picture of any individual case. These different symptoms in different persons vary infinitely in the degree of their severity,



from the common diarrhœa, with little pains and no cramps, and no greater affection of the circulation and temperature of the surface, than occurs from the operation of an ordinary purgative, up to the sudden attack of a prostration so alarming, that the sick man becomes scarcely sensible of pain when the secretions are retained, and the heart's action sinks at once.'

From the report of the Madras Medical Board, I shall transcribe a paragraph, on the state of the sensorial functions in the stage now under consideration.

'In a disease so highly congestive as Cholera, where vertigo, deafness, and ringing in the ears often prevail, and where very large quantities of opium and intoxicating matters have been swallowed, it is truly surprising, that the functions of the sensorium are so very rarely disturbed. It seems probable, that it is in many instances from an inaccuracy of language, that coma has been represented as a symptom of Cholera; for we find that patients, who have just been represented to be in a *comatose* state, can, with more or less facility, be roused from it; and, though he cannot overcome that retirement within himself, which constitutes so remarkable a feature of the disease, he will yet evince, by the clearness and precision of his answers, that his intellect is not destroyed. The same appearance takes place in tetanus, hydrophobia, and other diseases referred to the class of neuroses. This circumstance shows their affinity

with each other, and is calculated to make us pause in receiving doctrines as true, which impute such disorders to depraved functions of the nerves, whose origin, the sensorium commune, nevertheless, remains comparatively undisturbed. Coma must, however, be admitted occasionally to occur, especially towards the termination of the case, when it is fatal; but delirium has seldom or never been observed, unless as a sequelæ of Cholera, when other and foreign morbid actions have been established. That degree of incoherence, which has accompanied the excessive spasmodic affections of the muscles, or which has followed the free use of opium and spirits, is not considered as an exception to this remark.

‘Syncope is not a common symptom in Cholera, and when it has occurred, unless after venesection, it has generally been on the invasion of the disease. During the progress of this disorder, when the nervous energy seems to be almost annihilated, and the functions of the heart and arteries to be abolished, this symptom is yet very rarely observed! Deafness has been remarked, in some instances, to have been completely established, before any other symptom of the disease had developed itself; the patient continuing, for a time, to pursue his ordinary employments.’

The following sentence from Dr Lawries’ account of the British disease, (Edinburg, 1832,) is worthy of being read, in reference to the same subject.

‘The majority of medical men affirm that the mind

is always unimpaired. I can only say that it appeared to me, in many cases, affected to a degree little short of what we find it in concussion of the brain, probably owing to congestion in the vessels of the head. I remarked this particularly in several children. When undisturbed they lay in a dull, sleepy, semi-comatose state, breathing with perfect calmness. When roused, they thought only of relieving their distressing sensations, and vociferated for cold water. I had, at one time, five of the same family in one bed, all calling loudly for fluid to allay their burning thirst. So urgent were they, that they could be bribed to swallow any medicine, by the promise of a mouthful of cold water. When appeased, they relapsed into their previous sleepy condition.'

Mr Fife, of Newcastle, observes, in reference to this stage:

'That the action of the heart, carotid, axillary, and inguinal arteries, exceeds, beyond all proportion, that of the smaller vessels; and even when the pulse at the wrists is imperceptible, the heart and large vessels often labor violently.'

These successive extracts present as much on the symptoms of the second stage, as the limits of this work will permit, and all, perhaps, that can be advantageous to the reader. They pourtray a disease of strong and hideous features, traversing a vast continent; modified, it is true, but every where displaying *essentially* the same aspect.

It is impossible for any one who has seen the cold

stage of a congestive intermittent fever, to read these histories of the stage of collapse, congestion, prostration, or asphyxia, without being struck with the resemblance between the two.

*Third Stage, or that of Febrile Reaction.*

In cases which terminate most favorably, the stage of prostration is succeeded by one of healthy excitement, and the patient recovers rapidly. But, in many instances, to the great reduction of the powers of life, there succeeds a state of morbid excitement, displaying symptoms of a decidedly inflammatory character; corresponding, in some degree, with the hot stage of a malignant intermittent, but running on for several days, and often terminating fatally. I shall borrow, from Mr Orton, the history of this period of reaction, as he observed it in the the East.

‘If the termination is different, a favorable crisis occurs, which is almost invariably marked by sleep of unusual soundness, attended by warm perspiration, and light and natural respiration. The favorable change takes place at all periods of the disease, but most frequently before that morbid quiescence with its attendant symptoms, which have been noticed; for this state is very commonly followed by death. On waking, the patient feels himself thoroughly relieved, and expresses his satisfaction in the strongest terms; at the same time an evacuation of bilious fœces and urine generally takes

place; and from this period, a considerable purging of black, green, or yellowish feculent matter arises. At this time also, other signs of increased action manifest themselves; the pulse rises above the natural standard, both in frequency and volume; the skin grows rather hot, though moist, and frequently there is a copious perspiration.

‘The Bengal Medical Board have given a luminous description of this stage of excitement or reaction, which, in a greater or less degree, appears always to follow the favorable crisis. They have observed it rising to a great height, assuming all the characters of the idiopathic bilious fevers of the country, and occasionally becoming fatal. This, however, does not appear to have been commonly the case on the other establishments. A slight and salutary degree of reaction, only, has usually followed, which has quickly subsided. A rapid convalescence has generally ensued, and the strength and looks have been regained almost as quickly as they were lost.

‘Another very striking set of features of this proteriform disease still remains to be delineated; and although I have deferred, for the sake of perspicuity, the mention of them until now, they are amongst the most important, and most constant in occurrence. The burning pain in the stomach, increased on pressure, and the common circumstance of the ingesta being instantly rejected, are indicative of inflammation of that organ; and the ap-

pearances on dissection, fully prove that this affection takes place, perhaps in every instance. For, whenever the disease has been of sufficiently long duration, to allow time for appearances of inflammation to be formed, they are invariably found, not only in the stomach, but in the intestines. In many instances, we have the most convincing proofs during life, of the existence of inflammatory action in different parts of the frame. If the extreme depression of all the powers of life already described, and particularly if the state of torpor, which follows the morbid cessation of vomiting, purging, and spasm, is not quickly concluded by death, or natural sleep, the temperature, from being far below the natural standard, rises above it. If there is any vigor of the circulation left, the heat extends over the whole surface, and the moisture disappears; but if the powers of life are unequal to this, the trunk only becomes hot, the extremities continuing quite cold and moist. Under these circumstances, the pulse is also extremely quick—140 and upwards,—sharp, and occasionally possessing a peculiar irritated thrill, which is strongly expressive of inflammation of vital parts. The tongue grows furred and dry, and in combination with these symptoms, many local appearances occur, leading to the same conclusion. In some cases, the vomiting returns, and continues very frequent, the stomach rejecting every thing which is taken in, for several days; in others, there is fixed pain, and soreness all over the abdo-

men; and if the inflammation attacks chiefly the brain, there is occasionally muttering delirium, but more frequently coma, with deep and stertorous breathing, and suffusion of the conjunctiva, which quickly terminate in death. In cases which have lingered on in any of these states, and even when the topical symptoms are scarcely at all evident, the appearances of inflammation, on dissection, are strongly marked, and quite sufficient to account for death.

‘This inflammatory stage frequently lasts several, even many days. If the depression of the *vis vitæ* is extreme, the secretions of bile and urine, and perhaps nearly all the secretions, continue suppressed throughout. Under other circumstances, I have observed small quantities of high colored urine frequently passed; and black or green stools occur, without a favorable termination. On the commencement of this stage, the pulse usually becomes rather more distinct; but it is more from increased sharpness, than fulness; and we are presented with the remarkable phenomena of acute inflammation and extreme debility prevailing at the same time, and indicating opposite modes of treatment.’

On the stage of excitement, as it has appeared in Sunderland, Newcastle, and other places in the north of England, Dr Lawrie, in the work just quoted, has the following interesting observations.

‘*Febrile Stage.* A patient who has entered the stage of collapse, is rarely restored to health, without



passing through a fever closely resembling typhus. My residence in Newcastle was too short to enable me to say from personal observation, what is its usual duration, but I understood that it varied from seven to fourteen days. The ordinary cases present no peculiarity of symptoms, which could distinguish them from those of common continued fever. At first I thought the tongue cleaner, and the pulse less rapid; but more extended observation showed that these, especially the clean reddish tongue, are occasional, but by no means invariable symptoms.

‘Congestion of particular organs is met with at the commencement or during the progress of the febrile stage. By far the most common is that of the vessels of the brain, marked by apathy, listlessness, dilatation of the pupils, suffused eyeballs, low muttering delirium, or total insensibility. The fauces, in some cases in which the voice had been much affected, inflamed and suppurated. Inflammation of the brain followed one case of inflamed throat. The chest I rarely found affected. The respiration in the febrile stage is usually healthy, and the lungs free from congestion. I do not pretend to say that affections of the chest have no place among the sequelæ of Cholera, but that I have not met with them.

‘Congestions and inflammatory affections of the abdominal viscera are very frequent; indeed, it seldom happens that the functions of these organs are speedily restored. Under proper treatment the liver is not very obstinate. I thought affections of the

stomach, probably its mucous surface, as indicated by troublesome retching and vomiting, and of the bowels, in the shape of constipation, fulness, and pain on pressure, much more common. The secretion of urine is restored, the skin assumes its ordinary hue, and attains a febrile heat. The recovery is progressive, as from continued fever.'

On the relative frequency of the stage of febrile excitement in England and India, Dr L. makes these remarks.

'First, The premonitory stage occurs in a much larger proportion of cases in the English than in the Indian disease. In the latter it was the exception, in the former it is the general rule.

'Second, The febrile stage is incomparably more frequent. I have met with it in India, but it generally appeared to me to be connected with derangements of the abdominal viscera. In Sunderland and Newcastle the experience seems to be, that very few who have fairly entered the collapsed stage, escape the secondary fever.

'Third, I think the head is more frequently affected in the British disease than in the Indian — as indicated by greater mental oppression and insensibility during the collapse, and more congestion in the febrile stage. In this last particular, I believe I differ from some other observers. I speak, however, of my own experience only.

'Fourth, My observations would lead me to say that the frequent discoloration of the surface consti-

tutes a fourth peculiarity. I neither met with it so frequently, nor to the same extent in India.'

The stage of febrile reaction having been compared to typhus, I shall present, from Fife, a comparison between the two.

'In the reaction from Cholera, the pulse is slower, the intellect less confused, the breathing more oppressed, the sclerotica less injected, the skin less hot, perspiration more profuse, and thirst more importunate; the sudden appearance of stupor, apoplexy, or violent delirium, about the fourth or fifth day of reaction, more frequent and dangerous; tendency to a return of vomiting and diarrhoea, which is watery, though deeply tinged with secretions, enforced by the use of calomel, contribute to characterize the fever of Cholera.'

A remittent type, is the prevailing form of fever in India, and we have the authority of the Bengal Medical Board, that the consecutive fever of Epidemic Cholera, in the East, assumes 'all the characters of the idiopathic bilious fevers of the country.' In England, the prevalent fever is generally typhus, and we have just seen that the consecutive fever of the Epidemic simulates that type. Thus it is modified by climate and locality. In the valley of the Mississippi, reasoning from these data, we may anticipate that the consecutive fever will assume much of the character of our endemic bilious fever—especially if the disease should invade us in autumn.

I shall conclude the history of the symptoms with

the following summary, which the French Academy regard as diagnostic of the Epidemic wherever it has occurred.

‘In India as well as in Russia, the Cholera is found pretty well defined by the following symptoms, by which we may always readily recognize it. Epigastral pains, anxiety, vertigo, repeated vomitings, frequent stools; the matters discharged at first composed of recently ingested substances, but soon becoming fluid, whitish and flocculent; violent cramps, contractions of the superior and inferior extremities, coldness of the body; suppression of urine; the skin of the hands and feet pale, cold, moist and wrinkled; distortion of the features, hippocratic countenance; sinking and complete disappearance of the pulse, and total absence of vital reaction.’

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## CHAPTER IV.

### APPEARANCES AFTER DEATH.

THE morbid appearances observed in the bodies of those who die from Cholera, must of course be different, according to the stage of the disease in which death takes place. They may be referred to two heads. First, those which present themselves when death occurs in the stage of collapse or prostration; secondly, those which offer when the patient sinks under the consecutive fever, or stage of reaction.

*Morbid Appearances after Death, from Prostration.*

In the following extract from the digested report of the Medical Board of Madras, it is not stated whether the patients examined, generally died in the stage of collapse; but as that Board has not recognized a consecutive fever, and as the appearances which they describe, are, on the main, obviously referable to a state of congestion, and suspended or morbid secretion, their account will fall properly under the present head.

‘The external appearance of European subjects, who have sunk under the Cholera, closely resembles that which has been noticed as taking place during life. The surface is livid, the solids are shrunk, the skin of the hands and feet is corrugated. There seems no sufficient evidence of any uncommon tendency in the body to putrefaction after death, nor of any characteristic fœtor from the abdominal cavity. No particular morbid appearances have been found in any of the cavities of the body, which are lined with *serous membranes*, or in these membranes themselves. The cavities of the pleura, of the pericardium, and of the peritoneum have, almost uniformly, been found in a natural state; or, the deviations from that state have manifestly had no connexion with Cholera. The surfaces which are lined, or covered with *mucous membranes*, have, on the contrary, very generally exhibited signs of disease. These will be noticed as the organs connected with them come to be mentioned.

‘The lungs have not unfrequently been found in a natural state, even in cases where much oppression of respiration had existed previously to death. Much more generally, however, they have been found either to be gorged with dark blood, so that they have lost their characteristic appearance, and have assumed more that of liver, or spleen; or they have been found to be in the opposite state; that is, collapsed into an extremely small bulk, and lying in the hollow on each side of the spine, leaving the cavity of the thorax nearly empty. This appearance has been so remarkable as to induce Dr Pollock, of H. M. 53d regiment, to conceive that it could only be produced by the extrication of a gas within the cavity of the pleura, capable of overcoming the atmospheric pressure. It is understood, however, that opportunities were had of piercing the thorax of the dead body under water, and that no gas was extricated. As there appears to have been an absolute vacancy in the cavity of the pleura, that is to say, the lungs did not by any means fill it, it would seem that that viscus had exerted a contractile power, adequate to overcome the pressure of the atmosphere. The blood found in the lungs has been always very black. The heart and its larger vessels have been found to be distended with blood, but not so generally as the apparent feebleness of their propelling power, and the evident retreat of the blood to the centre, would have led us to expect. The right auricle and ventricle being gorged with blood is nothing peculiar to



Cholera; but some dissections have shewn the left cavities to be filled even with *dark* or *black* blood, which we may reckon as a morbid appearance more peculiar to it. In the abdominal cavity, the peritoneal coverings of the viscera, being *serous membranes*, present in general but little deviation from the healthy state; occasionally, indeed, the morbid accumulation of blood in the vessels of the viscera, imparting an appearance of turgidity and blueness, is evident on their exterior surfaces. We also find them bearing marks of inflammation, especially where the patient may have lingered long before death. In other cases, the whole tube has had a blanched appearance, both externally and internally. The stomach and intestines generally preserve their ordinary volume. The appearance of the omentum is not sensibly affected in Cholera. The stomach is found to be so variously affected as to destroy all grounds for pathological reasoning. It is very rarely found empty, or much contracted after death, nor has any appearance of spastic stricture of the pylorus been often detected. It has, however, sometimes occurred. Its contents appear to be chiefly the ingesta in an unaltered state; in some cases greenish, or yellow, or turbid matters are found. The stomach has been said to have been found "lined with calomel." Various appearances, either of active inflammation or a congested state of the vessels, have been noticed, sometimes in one part, and sometimes in another. The parts seem as if they were sphacela-



ted, thickened, softened, and friable; and, in short, exhibit so great a variety of appearances, from a perfectly natural state to the most morbid, that no particular light is thrown by them on the disease.

‘The intestinal tube is sometimes collapsed, but oftener found to be more or less filled with air; distended in some parts into bags or pouches, containing whitish, turbid, dark, or green colored fluid, and in others, presenting the appearance of spastic constriction. The latter, however, is not common. No fœcal or other solid matters are found in the intestines; but, very commonly, large quantities of the conjee-looking fluid, or of turbid serous matter. The duodenum, and occasionally the jejunum, have been found loaded with an adherent, whitish, or greenish mucus; at other times they have been found seemingly denuded of their natural mucus; and often perfectly healthy. Traces of bile in the intestines, or of any substance apparently descended from the stomach are exceedingly rare. Sanguineous congestion, and even active inflammation, are stated to be more common in the bowels than in the stomach; but, on the other hand, instances are very numerous, where no such indications have been detected. The thoracic duct is stated to have been empty of chyle. The liver has been commonly found to be gorged with blood, but not always; it is usually an organ very vascular; and it would probably demand a nicer discrimination than has been bestowed on the subject, to distinguish the degree of congestion in

which it is naturally left by the settling of the blood after death, in ordinary diseases, from that which has been observed after an attack of Cholera. The gall-bladder has almost universally been found to contain bile, and in the great majority of cases even to be completely filled with it. As is usual with this secretion in cases of retention, it is of a dark color. Very different states of the gall ducts have been described; cases of constriction and impermeability, seeming to be equally numerous with those of an opposite character.

‘The urinary bladder is found, we may say, universally, without urine, and very much contracted. The lining or mucous membranes of the bladder and ureters, have been found coated with a whitish mucous fluid. The smallness of the bladder, after death, has been generally adduced in proof of great spasm; but it is not unfrequently found to be equally small after death from other diseases; and it seems the nature of that organ, when it contains no urine, to contract, so as to leave no cavity. Dr Baillie, in his *Morbid Anatomy*, thus notices this fact: “The bladder is also found contracted to such a degree, as hardly to have any cavity. This is generally not to be considered as a disease, but simply as having arisen from a very strong action of the muscular coat of the bladder previously to death.” The appearance of the spleen, which is so various under the ordinary conditions of the body after death, has indicated nothing that can be mentioned as belong-

ing to Cholera. The vessels of the mesentery have been very generally found to be uncommonly full of blood.

‘In the head, appearances of congestion, and even of extravasation, have been frequently observed; but not so uniformly, nor to such extent, as to require any particular notice. Only one case has been given, where the state of the spinal marrow was examined; and in that, indications of great inflammation were detected in its sheath. The case, however, was, in some degree, a mixed one.

‘From this general view of the appearances found on dissection of the bodies of persons, who have died from Cholera, it is manifest, that the information thence derivable, is, in a pathological view, of a negative nature only. It is nevertheless, of consequence in a practical sense, especially in treating the sequelæ of Cholera.’

That the reader may institute a comparison between the morbid appearances observed in Asia and Europe, I shall extract Dr Hamett’s narrative of the phenomena observed in the dissection of twenty-one subjects, who died of attacks both rapid and protracted, in Danzig. The subjects were of various ages, from four to ninety years. Unfortunately, however, the Doctor, like most others, has blended the appearances observed in those who died in the various stages of the malady, which detracts much from the value of his labors.

‘Of all the morbid effects, in appearance, which I

have observed after death in the bodies of persons who died of Cholera in Danzig, the most characteristic, perhaps, has been the great congestion of blood in the sinus venosus and right auricle of the heart, and in the veins throughout the whole body; the next is the invariable contraction of the bladder; and another, which, although not apparently constant after death from this disease, is seldom or never to be met with after death from others; namely, slight spasmodic contractions, or movements, if they may be so called, in the muscular fibres here and there in the body, and more especially in the face and extremities, not only immediately, but sometime after dissolution. These resemble galvanic effects produced in the body after death.

‘The veins and right auricle, in particular, of the heart, were full of black blood; some was always found in the left auricle; while very soft, imperfectly coagulated lumps were found either within the right ventricle or within the aorta, either immediately at its commencement, or down below its curvature. These lumps were invariably as black as the blood found in the veins and right auricle; the thoracic aorta uniformly contained some black blood, but was never full, like the veins; the abdominal aorta also contained a little, but very little; the right ventricle had always a small quantity of black blood, the left ventricle a very little. The pericardium seemed more or less flaccid, and very often contained a quantity of dark brown serous fluid. The parietes of the

heart in general seemed soft, and I fancied, in a few instances, that those of the left auricle seemed thickened; this, however, remains to be confirmed or refuted by subsequent examinations. I occasionally observed morbid blackish or bluish, and in one instance, whitish spots on the external surface of the heart. The lungs were in general much more bluishly speckled than in most other cases, almost always collapsed, but dense from black blood—not as in hepatization of the lungs—frothy, black blood freely oozing from incisions made into them. The pleura in its reflections throughout, from the anterior to the posterior mediastinum, and over the upper surface of the diaphragm, seemed in general of a dark, dull red. The trachea, bronchia, and larynx contained a little frothy mucus, and were otherwise wet with a compound of serous and clammy fluid; but the internal mucous surface exhibited no vascular appearance. In general there was a considerable quantity of clammy, serous fluid found effused in the chest; all was wet, exceedingly soft and clammy, more so than I have been used to see after death from other diseases. The vena azygos was invariably full of black blood. The thoracic duct was in general empty, and seemed natural.

‘On detaching the calvaria from the dura mater, the latter was, in most instances, spotted all over with the black blood that instantly issued from the torn vessels, especially along the lines of the sutures, where they are most numerous, in the younger sub-

jects particularly. The external surface was mostly of a dark bluish color, and dry, but clammy feel. The internal surface of the dura mater, and its processes or continuations, were not marked by any peculiarity, except, perhaps, in the appearances being more opaque, and feeling more clammy than usual. The tunica arachnoidea was in general of a wheyey, glossy color, and somewhat clammy to the touch. Between this membrane and the pia mater, and more especially in the lower part of the cerebellum, there was occasional effusion or filtration of serous fluid; and in all instances there was considerable effusion of this fluid between the pia mater and the cerebrum and cerebellum both; in most instances it was found in the ventricles, in the fossulæ at the basis of the cranium; and, indeed, wherever this effusion between the tunica arachnoidea and pia mater in parts of the cerebellum, and the pia mater and the brain itself at large, was observed; it was also invariably observed, in the same relative situations, in the spinal marrow of those bodies in which the spine was examined—which were fifteen in number. In other instances, too, where there was effusion in the brain, we had only to elevate the pelvis and loins in order to see serous fluid issue forth from the spine through the occipital foramen. There was always a considerable quantity of thin black blood in the sinuses; in the inferior, more so, particularly. In all cases the congestion of black blood in the veins of the pia mater, in

the venæ Galeni, and choroid plexuses, was great, accompanied with varicose dilatation of these vessels; and likewise the same relative congestion of black blood in the veins of the pia mater, in the spine, especially in the posterior parts of it, where these vessels being larger and more numerous, varicose dilatation was more conspicuous. The medullary substance of the brain seemed in some instances much softer than usual, but it might have been owing, in part, to the interval elapsed during hot weather between death and the time of examination. In some instances black spots were visible on incisions into the brain; at times, too, the cineritious and medullary substance both seemed relatively altered in appearance as well as consistence. The state of the spinal marrow corresponded, in all cases, exactly with that of the brain.

‘ After what has been said and implied of the venous congestion in the brain, spinal marrow, and thorax, it will be readily conceived in the abdomen, in which the large as well as small vessels are still more numerous and varied. The vena cava, abdominalis, and vena portæ, with the splenic and superior mesenteric trunks, and, in short, all their large tributary branches, invariably contained a considerable quantity of black blood; they seemed at times as if full of it, while the mesenteric veins always exhibited a characteristic black or bluish arborescent appearance throughout. The gall-bladder was not only of a deep green externally, but in some instances,



from a deep green to a bottle-green, and occasionally tinged here and there with yellow; and was in general distended, and full, or nearly full of fluid, generally black, and sometimes as if a little of yellow or brownish yellow bile had been mixed up in it. The internal or villous coat of the gall-bladder was in general between a dirty yellow brown and brownish yellow; in a few instances it was a natural bilious yellow. The liver was invariably in a state of *engorgement* from the black blood, which, in all states of it, freely oozed out from the hepatic veins, in particular on incisions into its substance; it was in general discolored, even after sponging the membrane covering it, and I think most in the younger subjects, and those who had not suffered from previous affection of it. The spleen was also in a state of *engorgement*, and of a black purple color; and this independently of any alteration in its structure as referrible to other morbid states. The kidneys, notwithstanding the suppressed secretion of urine, did not exhibit any peculiar change in general, further than that of venous congestion. The same was observed in the pancreas. It is not easy to say whether the ductus communis choledochus, and immediate biliary vessels were in general contracted or not; sometimes I found greenish or vitiated bile at the opening of it into the duodenum, and sometimes I did not. I often found, in protracted cases particularly, the external parts of the duodenum and colon in contact with the gall-bladder, or near it, completely discol-

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ored with yellow bile. With respect to the stomach and intestines generally, I cannot say that I observed any effects of the disease beyond what is referable to congestion of blood in the veins, and what might be attributed the sedative nature of disease. The mucous coat of the stomach, in particular, and parts of the colon, seemed, in some instances, soft, as if half macerated; indeed, the intestines generally seemed soft, and as if the internal mucous and villous coat could be separated from the muscular coat. The small intestines, I mean the jejunum and ileum chiefly, were more commonly of a dark, dull red, or rather of a dark, dull slate color, on their external peritoneal coat, without any positive vascular appearance; sometimes of a pale slate color, with vascular injection, or vascular congestion more marked; while, on the internal surface, they did not exhibit the same color generally, still, in some instances, there was in some parts a modified appearance of it; whilst in various parts, in others, there was a manifest vascular appearance of the internal mucous and villous coat, though by no means corresponding to that externally. Besides the pale slate or leaden color, and the dark red slate color, I have observed a vascular dark red also—facts which will account for that tenderness or pain on pressure of the abdomen, so marked in Cholera, especially in protracted, fatal cases. In one instance of a young woman, who had died of true and very rapid Cholera, the general external appearance of the whole of the small

intestines was of a pale or light rosaceous hue, while that of the colon was quite pale. The mucous membrane throughout the whole canal was whitish, and as if half macerated.

‘Whether the brown patches which are at times observed here and there on the internal surface of the stomach and intestines, are effects of the disease, or of previous chronic inflammation, is, in some instances, not easy to determine. The stomach and intestines, as might be expected, mechanically retained the last fluid ingesta; for, latterly, what came away, did so involuntarily. There were the remains of former mucus, more or less, throughout the whole digestive canal; and in true, rapid, and fatal Cholera, little or no remains of feculent matter, except in its usual receptacles, namely, the commencement of the colon, the cæcum caput, in the transverse arch occasionally over across it, and in the sigmoid flexure, in which, in some instances, scanty portions of it were found. The mucous follicles, in the internal membrane of the colon at its commencement, and Peyer’s glands in the end of the ileum, were occasionally found in large compact patches, more or less continuous, distinct, elevated, and somewhat indurated. Brunner’s glands, as they are called, were not so observed in the duodenum. The colon, externally, as well as the duodenum, particularly at its upper curvature, was discolored at the upper part of the ascending portion, and beyond, in the greater part of the transverse

arch, but in the other parts it was of a pale, or pale lead color. The peritoneum, in all its detached reflections, was more or less opaque, having lost its shining, glossy color, more than in most other congestive and sedative diseases of the system, attended with fever, more even than in the compounds of remittent and intermittent fevers, in tropical climates, with marsh miasmata, in which venous congestion is so very notorious. In protracted, fatal cases, I occasionally observed chronic discoloration here and there on the internal surface of the stomach and intestines; in some instances of a dark brown, in others of a dark brown red, without being exactly vascular in appearance. At times, vascular spots and patches were observed in some parts of the intestines, and the dark brown, and dark brown red in others. They were generally in the colon, the commencement above and below particularly, in the transverse arch, and sigmoid flexure. I observed parts of the colon in a gangrenous state, and chronic inflammation of the whole of the ileum in one subject. In several instances, the lumbricoid ascarides were found in the intestines. In some instances, the commencement of the thoracic duct, or receptaculum chyli, seemed quite close and contracted. The invariable close contraction of the bladder, I have not omitted to mention; it was mostly lined with a little whitish mucus.

The following account, extracted from the report of the French Academy, presents the appearances

observed by Dr Labrousse, in the bodies of twelve blacks, of the island of Bourbon, who died within twelve hours after they were attacked, and of course in the stage of prostration.

‘In some, the brain had undergone no change; whilst in others, its substance was found softer than in the ordinary state. The longitudinal sinus was gorged with blood, and the lateral ventricles contained a small quantity of sanguineous serosity.

‘The lungs were sound; the pericardium contained a little serum; the heart was slightly enlarged; the coronary vessels were always filled with a very black and coagulated blood; no adhesion was observed in this cavity.

‘The gastro-cholic epiploon, and the internal surface of the intestines as well as the mesentery, presented a slight degree of inflammation and a great repletion of their vessels.

‘The gall-bladder, very much distended, contained a thick and blackish bile. The hepatic, cystic, and choledic ducts were twice their natural size; the spleen, pancreas, and kidneys, presented nothing peculiar. The bladder was greatly contracted, and in a state of complete vacuity. The stomach, distended with gas, was otherwise empty in several; in others, it contained a greyish white viscid fluid, and some worms. The gastro-intestinal mucous membrane, sound in some individuals, presented in others an intense inflammation, which increased from the pylorus to the rectum. The other

tunics participated in this inflammation, with the exception of those of the jejunum and ileum.

‘Their cavity enclosed a sero-purulent liquid and sometimes lumbrici.’

In the opinion of Dr Christie, say the French Academicians:

‘The mucous system is the principal seat of Epidemic Cholera, and it is a catarrhal state of this system, which constitutes the special modification of it. This modification is, in its turn, nothing else than the increased and vitiated action of the secretory vessels of the mucous membrane, and an extraordinary alteration in the secretion. Dr Christie has almost uniformly found the mucous membrane of the intestines pale, white, softened, doughy, very lacerable, and coated with a large quantity of whitish, viscid, opaque, creamy fluid.

‘These facts, which, in themselves, are of the highest importance, and which have been likewise confirmed by many observers, are nevertheless presented in a manner too general, too exclusive, by Doctor Christie. Without doubt, these conditions of the mucous system exist in many cases of Cholera, but they are not in themselves alone the entire disease. In the normal state, the intestinal mucous membrane is also pale, white, and soft; the only difference, then, is in degree, and this softening of the internal mucous tunic, is far from constantly presenting itself in the autopsic examinations consequent upon Cholera. The mucous follicles, the glands of Peyer and Brunner, especially destined

for the secretion of the intestinal mucous fluids, are without any material lesion in the Cholera, notwithstanding their functions have been manifestly impaired. In the catarrhal state, the occurrences which take place are decidedly opposed to those which ensue in consequence of the inflammatory state of the latter organs.

‘From the labors of Christie, it appears that the existence of a catarrhal affection, as an integral part of the Cholera, cannot be doubted; but, on the other hand, this opinion, entirely exclusive, cannot be admitted as such.’

But few dissections have been made of Cholera patients in England, on account of the popular prejudices against that practice. The principal results of those which have been undertaken, are set forth in the following words, in the Medico-Chirurgical Review, for April, 1832.

‘The entire absence of fœcal matter in the contents of the intestines; the presence, in greater or less quantity, of matter such as the peculiar evacuation; the serum-like fluid, more or less abounding with flocculi of coagulated albumen, which are occasionally found in such quantity as to line the mucous membrane with a tenacious substance, like paste; an odor of putrifying mucus, somewhat like that of offensive lochial discharges, occasionally present; the serous fluid being frequently more or less tinged with blood, and that of the stomach, often mixed with the latest ingesta; the upper part of the duodenum often slightly tinged with bile; frequently, contrac-



tions of different portions of the colon; occasionally, intussusceptions; the gall-bladder distended with unhealthy bile; its ducts sometimes strictured, and the urinary bladder empty, and remarkably contracted.

‘The mucous membrane of the alimentary canal generally somewhat softened; sometimes of an unnatural paleness throughout, but oftener having various portions tinted of different hues, from the pale rose to dark brick-dust and slate colors, as venous or arterial injection predominates; patches of ecchymosis and arborisations of the larger branches are frequent; but the most common appearances have been a red or purplish speckling of the membrane, generally over the whole, or more apparent in some parts than others; or an injection confined to the prominent parts of the rugæ of the stomach and valvulæ conniventes of the intestines. Sometimes these different appearances are scattered throughout the whole extent of the mucous membrane; at other times, the stomach alone is colored, and the intestines pale, or the stomach pale, and different portions of the intestines darkly injected; however, these appearances are most frequent about the smaller extremity of the stomach, and lower portion of the ileum. The venous trunks of the stomach and intestines are generally found greatly engorged; such, also, frequently takes place with the liver and spleen, and almost in every case in the venæ cavæ, and auricles of the heart. The blood remaining

fluid, of an exceeding dark and peculiar consistence and adhesiveness, likened by some, to treacle poured over the cavities of the heart. The lungs frequently exhibit a remarkable shrinking, like that of the skin and subcutaneous tissues, (which led in India to the body being opened under water, to ascertain if air existed in the cavity of the pleura,) then blood of the same dark hue; frequently they are engorged so as to resemble hepatization somewhat, but still crepitous and lighter than water. The obstruction of the bronchiæ by peculiar secretions, has not here been noticed amongst the cases from the north of England. The brain of two only has been examined; in one, the vessels were very turgid, and half an ounce of serum was contained in the lateral ventricles; in the other, a very highly injected state of the vessels externally to the brain; and in the cortical substance of the upper parts of the hemispheres, and in the cortical substance or upper part of the medulla oblongata was found, with depositions of lymph upon the surface of the brain, and cerebellum, and five or six ounces of serum in the base of the skull.

‘Turgesence of the vessels of the brain and spine has been at all places a very frequent appearance, and serous effusion beneath the arachnoid in the cavity of the cranium and spinal canal, and in the lateral ventricles. It has seldom been observed how often these appearances have existed; but in the report of Dr Kumes, from the Mauritius, (decidedly the

best of any which have yet been published, as affording the greatest extent of information on the many important considerations connected with the Cholera,) in thirteen cases, where the brain was examined, serous effusion was found in all but two, one of which appeared natural; the other was mangled by an officious orderly during a momentary absence of the operator; and in one half of the cases where the spine was examined there was effusion under the dura mater of the cord, and the veins generally turgid.

‘It has been a general complaint, that the state of the organs after death has thrown no light on the nature or causes of the disease, and that they afford no explanation of the severity of the symptoms. It is true that they do not explain these, as the inflammation, tumefaction of the membrane, and fibrinous effusion in croup, does the peculiar affection of the voice and suffocation met with in that malady; but they do throw as much light, as post-mortem examinations in general, on the seat and nature of diseases.’

Here again we are not informed in what stage of the disease the patients died, who were examined.

*State of the Blood and Secretions in the Stage of Collapse.*

The blood of Cholera patients, in the second stage, and after death, has attracted attention wherever the disease has prevailed. It is black, pitchy, and coagu-

lates loosely, is deficient in serum, and often has the same qualities in the arteries and capillaries, as in the veins. As Dr Davy, from observations made in Ceylon, found that Cholera patients in this stage of the disease did not exhale more than one third the usual quantity of carbonic acid, the blood is probably loaded with that gas, or with carbon. The suspension of other excretions, such as the perspiration, the bile, and particularly the urine, must contribute in the same manner to the deterioration of the vital fluid. To the retention of the elements of the last excretion, and their elimination through the skin or lungs, should; perhaps, be ascribed the offensive odor which Cholera patients are said to emit. Indeed, it is asserted that this odor is sometimes distinctly urinous. The discharges from the alimentary canal deserve consideration. They are so copious as to be vicarious of the suppressed secretions of other parts, and no doubt vary considerably in their composition. In their physical character, as is known to all the world, they resemble turbid rice or barley water. Dr Ainslie asserts that he has found this fluid to contain a free acid; Dr Christie declares it does not; others have detected in it a free or carbonated alkali. All these observations are doubtless correct, in different cases. Dr Bell regards this fluid as the product of mere exhalation or transudation. It is, in fact, the serous and fibrinous portions of the blood, strained off, in a morbid condition.

On this subject the experiments of Dr O'Shaug-

nessy, at Sunderland, are of deep interest. He obtained the following results.

‘1. The blood drawn in the worst cases of the Cholera is unchanged in its anatomical or globular structure. 2. It has lost a large portion of its water; 1000 parts of Cholera serum having but the average of 850 parts of water. 3. It has lost, also, a great proportion of its natural saline ingredients. 4. Of the free alkali contained in healthy serum, not a particle is present in some cases, and barely a trace in others. 5. Urea exists in the cases where suppression of urine has been a marked symptom. 6. All the salts deficient in the blood, especially the alkali or carbonate of soda, are present in large quantities in the peculiar white dejected matters.’

At the same place, Dr Clauny analyzed the blood of two patients, one dying of common cholera morbus, in October, the other of Epidemic Cholera, in December. The annexed statement will show the comparative results.

	Cholera Morbus.	Epidemic Cholera.
Water, - - - - -	756 - -	644
Albumen, (coagulated,) -	121 - -	31
Coloring matter, - - -	59 - - -	253
Free Carbon, - - - - -	32 - - -	66
Fibrin, pressed and dried, -	18 - - -	6
Muriates of soda and potassa, } carbonate of soda, and ani- } mal extraction, - - - }	14 - - -	0
	<hr/> 1000 <hr/>	<hr/> 1000 <hr/>

From the whole of these facts, it is quite obvious, that in the stage of collapse, in Epidemic Cholera,

the blood undergoes a signal and pernicious change in its chemical constitution and living qualities.

*Morbid Appearances in those who die of the Consecutive Fever.*

It is unfortunate, that most of those who have reported of the dead from Epidemic Cholera, should not have classed the subjects opened, according to the stage of the disease in which they died. When death occurs in six or twelve hours, traces of inflammation, will seldom be found on dissection, except such as are referable to some previous chronic disease; congestions only will exist. But when death is the effect of the consecutive fever, the ravages of inflammation will be apparent somewhere; because time has been allowed, and the stage of reaction is, perhaps, always attended with visceral inflammation. Had this distinction been attended to, the reports on this subject would have been far clearer, and much more instructive.

For this division of our subject, I have met with but few facts. The following is to the purpose. The appearances on the dissection of twelve blacks, in the Island of Bourbon, by Dr Labrousse, have been already stated. They died within twelve hours, and exhibited few or no signs of inflammation.

‘The examination,’ say the French Academicians, ‘of the bodies of ten other blacks, who died in the first four days of the disease, presented nearly the same phenomena in the three cavities, unless it was that

the inflammation was more intense. Gangrenous spots were then observed in the small intestines, and the substances contained in their cavity seemed to be the same with those of the dejections.'

It has to some appeared marvellous, that, in those who die from Cholera Epidemica, the lesions of structure are not greater. But what time is allowed for building up morbid structures, or demolishing the healthy, when the disease arrives at a fatal termination within a single day, and from the first hour of the attack, the vital actions, including nutrition, are nearly suspended! In the next chapter, we shall see, that the cause of death should be sought in something else than visceral decomposition.

## CHAPTER V.

### NATURE OF THE DISEASE.

WHATEVER may be the remote cause of Epidemic Cholera, it approaches to that of remittent fever, or dysentery, in this, that its effects are immensely different in degree.

#### *First or Forming Stage.*

We have seen, that, during the reign of the Epidemic, great numbers are apt to be affected with gastric and intestinal irritation, of a mild kind, accompanied more or less with muscular debility.



These affections are of every grade, from the slightest indisposition, up to malignant and mortal attacks; and are evidently the offspring of one cause.

When Cholera is epidemic, all who are affected in this mild manner, may be said to labor under the first stage of the disease. In many, it goes no further; but others, from the additional impress of the remote, or the action of auxiliary causes, suddenly fall into the second stage,—prostration.

The poison, in its limited or chronic action on the system, is evidently an irritant; in its violent or sudden impress, both an irritant and a sedative. In these respects, it bears a close analogy to many narcotics, which, in small doses, are irritating and stimulant; while, in larger, they directly depress the powers of life. On what part of the living body this agent makes its onset, remains to be discovered.

1. Like electricity, it may penetrate our organs, and, by its actual presence, exert a deleterious influence.
2. It may stamp itself on the dermoid, or mucous surfaces, or both, and communicate its baleful influence to the internal parts, through the medium of the nervous system.
3. It may be absorbed through the lungs into the blood, and circulate as a virus; or, changing the composition of that fluid, render *it* a poison to the organs which it should sustain. In whichever of these modes it makes its invasion, no part of the body can be said to escape the consequences of its impress; for the symptoms denote that every organ is scathed, though not, perhaps, in an equal degree.

It must be admitted, however, that the functions of the stomach and bowels in this first, as in the second stage of the disease, are more disturbed than the other functions of the body; and, therefore, that the remote cause is either applied to the mucous membrane of those parts, or, acting upon other organs, has a specific tendency to direct its effects upon those viscera. The French Academicians do not regard this affection of the stomach and bowels as inflammatory. They denominate it catarrhal. But catarrhal disorders of the mucous membranes are often inflammatory; and I do not doubt, that the functional disturbances now under consideration, are frequently of that nature. When they occur in the aged, and in persons of frail or feeble constitution, this doubtless is not the case; but in the robust and youthful, it can scarcely be otherwise. The influence of temperament, in this case, as in many others, must be decisive. The nervous and phlegmatic, will have intestinal irritation, with morbid secretion, and increased peristaltic action, merely; the sanguineous, and the sanguineo-bilious, *inflammatory* irritation and fever. A certain degree of the latter affection, is, indeed, a common occurrence in Europe, where the first stage of Epidemic Cholera is much more protracted than in Asia. It should be recollected, however, in reducing these views to practice, that slight inflammatory affections of the mucous membranes, often reduce themselves by the increased secretion which they

excite; and, therefore, that in cases of protracted diarrhœa, but few inflammatory symptoms will in general remain, where many might at first have existed. Connected with this intestinal affection, either inflammatory, (gastro-enteritic,) or merely catarrhal, that is, consisting in excessive and morbid secretion from the mucous membrane, there is generally a deficient secretion of bile; and, in proportion as this function is improved, the intestinal disorder is mitigated.

*Stage of Collapse, Prostration, or Asphyxia.*

Whether this stage is preceded by that which I have just described, or the individual has been previously in health, the invasion of the stage now under consideration, is always sudden. The Asiatic writers describe it as sometimes striking down and destroying its victims, within a single hour; in some instances, almost as soon as if they had breathed an atmosphere impregnated with carbonic acid or carburetted hydrogen gas, and with symptoms, which, in the coal districts of England, have been compared to those occasioned by the inhalation of the latter. In all these cases, however, there was, no doubt, a slight and brief premonitory affection, to which the patient did not pay attention.

As yet, all attempts to trace a consecutive series of morbid actions, from organ to organ, in this stage of the disease, have been unavailing. The organs generally are fatally stricken. The state of the pa-

tient has even been compared with that from concussion of the brain. Many organs cease to act, and others, being sorely crippled, exert themselves feebly and irregularly. The great function of innervation, (that of the nervous system,) is almost suspended; and the remnant of sensibility, both animal and organic, altered; the equilibrium of the circulation, as an inevitable consequence, is broken up; the enfeebled heart can no longer propel the blood to the more distant viscera, the muscles, and the skin; the vessels equally fail in their co-operation, and the vital fluid, undecarbonized and impure, stagnates in the great trunks and the portal and pulmonary circles, in the vena azygos, the spinal marrow, and the brain. Thus the universal and governing functions of innervation and circulation are deeply smitten and deranged; the lesions they have suffered, reciprocally promote each other; and as every other function is subordinate to these, so every other is of course reduced and perverted. That of the lungs is arrested till the little blood which the organ transmits is sometimes found, of a black color, in the aortic ramifications during life; the secretion of bile is nearly, often quite, suspended; the bladder is contracted from deficiency of urine; the skin is dry, or bathed in the kind of exhalation which, in most fatal diseases, precedes death; the healthy mucus of the stomach and intestines is replaced by a sero-mucous exhalation resembling barley water; the calorific function is reduced to the point of actual suspension in the limbs,

which during life sink almost to the temperature of the surrounding bodies; finally, the contractions of all parts of the muscular system—those of respiration, of the extremities, of the heart, and the alimentary tube, become morbidly excited, as in syncope from the loss of blood, or excessive vomiting and purging from tartrate of antimony. The various excretions from the blood, including two-thirds of the carbon exhaled in respiration, being retained, contribute to the impurity of that fluid; so that the central organs are not merely engorged, but engorged with a vitiated blood. This contributes to sink still lower their vital powers, already reduced by the direct action of the remote cause, and the patient frequently dies in as short a time, as if a solution of arsenic or antimony had been injected into his veins.

All who have witnessed the phenomena and morbid appearances of Epidemic Cholera, have been struck with this altered condition of the blood. Black, tenacious, grumous but still coagulating imperfectly, loaded with the elements of the suspended or impaired hepatic, urinary, cutaneous, and pulmonary excretions, it is certainly no longer the *vital* fluid. But can we deduce the various symptoms of the disease from this unhealthy state of *one* of the elements of the organism? Does not the unhealthy state of the blood result from previous disease in the solids? To a very great extent, it undoubtedly does. But may not the blood have undergone a change of composition, from the primary action of the remote cause? And

may not all the symptoms of the malady be produced, consecutively, from this change? It is impossible to show that this is not the case, but sound philosophy requires the affirmative to be established. What then are the facts which go to prove that the remote cause of Epidemic Cholera is absorbed, poisons the blood, and circulating throughout the organs, overthrows their functions? I know of none; and yet, as a hypothesis, am not disposed to reject the doctrine. In reference to the cure of the disease, it is a safe hypothesis, for it suggests all the measures which have as yet been found beneficial, and no others.

The condition of the heart, should especially fix our attention. Its movements are feeble and inefficient; it struggles, and, beyond a doubt, from its pre-eminent muscularity, participates in the cramps and spasms of the more external muscles, and the muscular coat of the stomach and bowels. It was in view of this convulsive action, keeping the organ, by presumption, in a state of spasmodic rigidity, that tobacco injections have been proposed, and, as we shall see in the next chapter, employed with some advantage.

The brain, on the contrary, has been said to be comparatively unaffected. It is true, that in its sensorial and intellectual operations, that organ manifests but little impairment; but as far as it presides over the internal or nutritive functions of circulation and secretion, it is obviously much reduced in its energies.

The spinal marrow has been supposed to be par-

ticularly involved, and Dr Saunders, of Edinburg, informs us that Dr Wright has found in his India dissections abundant evidence of this fact in the lesions of that part. Others, also, assert that they have found the morbid anatomy of that part such as to justify the opinion that it had been specially affected. On the other hand, it has been declared by several physicians, who have examined those who have died from Cholera, that the spinal marrow is often entirely sound. The universal spasms, and other disturbances of the parts supplied by nerves from that organ, would indicate, however, that in most cases it must be deeply involved.

Some physicians have insisted on the great involvement of the system of ganglionic, or sympathetic nerves; and endeavored to deduce the grave affections of the circulation from a reduced state of energy in that system, which, in their opinion, presides over, and regulates the circulation of the blood. I have no doubt, that the ganglionic system is extremely morbid, and quite feeble in the influences which it sends out; but believing it designed to preside over the functions of the viscera, rather than the circulation, I cannot find the *rationale* of all the symptoms, in a morbid state of this subordinate portion of the nervous system; which, moreover, is often found quite free from morbid appearances in those who die of Cholera.

Others have deduced all the symptoms from a diseased state of the lining membrane of the stomach



and bowels, which spreads a sympathetic influence over the other tissues and organs; and they cite the intestinal irritation of the first stage, and the violent vomiting and purging, the severe gripings, and the copious excretions of the second stage, as evidences sufficient to establish this doctrine. I cannot, however, regard them as conclusive. Concussion of the brain will excite vomiting; offensive odors may cause both vomiting and purging; the extirpation of the kidneys has been followed by copious, foul evacuations from the intestines, in which, no doubt, the retained elements of the urine passed off; injections into the veins, produce, as far as the alimentary tube is concerned, many of the symptoms of cholera morbus; finally, dissections have shown that the mucous membrane is, like the other membranous tissues, in most cases, pale and bloodless. The discharge through this membrane, by secretion or exudation of a great quantity of fluid, does not prove that it was primarily affected. A copious diarrhœa attends the latter stages of many disorders that originate in parts remote from the stomach and bowels. In these cases the secretions from the skin, kidneys, and liver, are generally suspended. That from the mucous membrane of the bowels alone remains. It is, in fact, the last to fail in most diseases. In Epidemic Cholera, this membrane is the strainer through which the materials that should pass off from the blood by other outlets, make their escape. The excretion is vicarious. Its immediate cause, is, perhaps, the impure

dissolved state of the blood, rather than an active secretory orgasm in the membrane itself. The true prototype of this affection, I am disposed to think, is the copious watery diarrhœa, which follows the absorption of the effused fluid in dropsy; and evidently results from the secretory or secerning membrane of the bowels, being acted on by the offensive matters which are circulating with the blood. To conclude, the vomiting and purging, and the cramps of the stomach and bowels, do not absolutely require us to adopt the theory of deep mucous irritation; for we find in them all, nothing more than that condition of the peristaltic coat of the bowels, which prevails throughout the whole muscular system, both animal and organic.

I have already referred to the resemblance between the symptoms of the cold stage of a malignant intermittent, and the second or cold stage, as it literally is, of malignant Cholera. If we look at the state of the vital properties and powers, and the condition of the circulation and secretions, with the exception of those of the intestinal mucous membrane, we shall find reason to believe that the two maladies quite as closely resemble each other in their pathology.

*Stage of Reaction, with Consecutive Fever and  
Inflammation.*

Many patients emerge from the stage of collapse, with healthful feelings and organic sensibilities; an

equable circulation, and restored secretions. The revived excitement is indeed that of health, and after a short convalescence, they are quite well. In others, however, the organs awake in morbid instead of healthy excitement. A hot stage succeeds, and the disease runs on through another *stadium*, which is characterized by the signs of local inflammation and fever. Let us inquire into the origin and progress of this stage of the malady.

We have seen, that in the first and second *stadia* of the disease, the excitability and sensibility of all the organs, are reduced and altered from the healthy condition; secondly, that the blood, taking a centripetal course, has deserted the skin and muscles, and accumulated in the great cavities—the head, the chest, and abdomen. Now, when, by the energies of the constitution alone, or aided by powerful stimulation, the vital properties are revived, they often become excessively acute, but continue morbid; and when the heart has again begun to act efficiently, and the blood becoming centrifugal, returns towards the surface, it may happen that some tissue or organ, generally, it would appear, the brain and its envelopes, or the mucous membrane of the stomach, remains in a state of engorgement or congestion, while its vital properties are revived, but continue in an altered condition. Here, then, are the proximate elements of a local inflammation. The nutritive function is restored; or rather the capillary apparatus of nutrition is active, but the function which it executes,

is morbid—in other words, the part is inflamed. Hence, the origin of consecutive fever, with inflammation. It is, indeed, the hot stage of the disease, and grows out of the cold, as in other cases. Its duration is various and its termination uncertain.

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## CHAPTER VI.

### TREATMENT.

Much has been said, especially in the non-professional journals, of the opposite methods of treatment which have been pursued in Epidemic Cholera; but the contrariety is more apparent than real. The ends in view have generally been the same, but the means adopted have been various, and the disease has often been cured by such as seemed to be opposite in their effects. Thus, different cases have yielded to blood-letting, emetics, opium, or external stimulants, separately employed; while others have been successfully treated by the whole combined.

The desideratum in the treatment is, a medicine, which, by a direct operation, would restore the nervous system to the state which preceded the action of the poison; but it would be Utopian to expect such an antidote. Meantime we can only seek to correct its effects. In contemplating these by the light of the symptoms and appearances after death, there is

room for some diversity of opinion on the indications to be fulfilled; and no *methodus medendi*, can, perhaps, be laid down at the present time, against which plausible exceptions in theory, and still more formidable objections in practice, might not be raised.

In proceeding to consider the treatment, I shall have a reference to three stages of the disease which have been recognized.

### 1. *Treatment of the First or Forming Stage.*

When the Cholera has invaded a place, or is impending, it is extremely imprudent for those who are attacked with complaints of the stomach and bowels, however slight, to suffer them to run on. They either originate from the epidemic state of the atmosphere, and are *the* disease in its first stage; or from other causes, and strongly predispose to attacks of the prevailing malady.

The means necessary and proper for rectifying this condition must, of course, vary according to the symptoms and constitution of each patient. When any febrile commotion exists, blood-letting is required; and the omission of it, in some cases, may be fatal, as these symptoms are frequently the consequence of an inflammation in the lining membrane of the stomach and bowels. If there should be severe abdominal pain, or great epigastric tenderness, connected with an excited state of the pulse, cupping or leeching will be highly beneficial. On the other hand, if the patient labor under simple nervous irri-

tation, and the pain be purely spasmodic, the tepid bath and hot fomentations to the abdomen, with the subsequent use of a flannel bandage, will be serviceable.

The condition of the liver should be strictly considered in these cases. The patient will invariably pronounce himself *bilious*; but the physician, who inquires rigidly, will generally find, that there is a deficiency of bile, and that the liver requires to be stimulated. One of the means of accomplishing this, is the addition of the nitro-muriatic acid, to the water in which the patient is bathed. But internal remedies are more to be relied on; of which, the best are the mercurial preparations. When the patient is feverish, calomel may be administered, and 'worked off' with an active, but unirritating cathartic; such as Rochelle powders, castor oil, Epsom salts, or magnesia and lemonade. Sometimes the common mixture of calomel and jalap will answer the purpose. On the succeeding night, the patient should bathe his feet, and take Dover's powder, or a pill of opium, calomel and ipecac, and endeavor to excite perspiration, by hot diluent and demulcent drinks. But if he be devoid of fever, and of a weakly or irritable habit, active purging will be improper; and opium and calomel, or the blue pill, should be administered at night, in decisive doses, succeeded in the day by magnesia, with mucilages and aromatics, or the cretaceous mixture of the shops, or the compound tincture of rhubarb, or

a decoction of rhubarb, with spices. In a few cases, the vegetable astringents and tonics, with more or less opium, will be required; for it often happens, that unless the excessive secretion from the bowels be corrected, the suspended action of the liver cannot be restored. If a state of costiveness succeed to the diarrhœa, it may be obviated by the compound tincture of rhubarb, or the tincture of rhubarb and gentian.

Throughout the whole period of this stage, strict attention should be paid to the diet and drinks of the patient. The stomach and bowels should not be overloaded and irritated with food of any kind; and especially that which is crude and indigestible. The best, in cases somewhat inflammatory, will be gruel, barley water, whey, arrow-root jelly, and weak soup. In other cases, the soup may be more stimulating; tender animal food, in small quantities, with condiments, will be admissible; to the arrow-root, spices and a little wine or brandy may be added; roasted potatoes, light bread toasted, and crackers, will be proper. Finally, boiled milk with rice, or diluted with an equal quantity of strong hyson tea, will be beneficial.

As to drinks, he should be temperate in the use of beer, and still more so in that of new cider. If he have fever, wine and ardent spirits, however diluted, will be improper; and he should limit himself to water, herb-teas, and weak lemonade. When no fever is present, and the diarrhœa has run on for



some time, good port wine, French brandy, or old whiskey, diluted with water, will be serviceable.

The state of the skin should be particularly attended to, in this stage of the disease. It will be always dry; and, except when fever is present, dry and cool. Frequent bathing of the feet in hot brine will be proper; and the use of frictions, with flannel, to the surface, and woollen hosiery will do much good. The patient should carefully avoid getting wet; remaining long exposed to the evening air; sojourning in damp situations, or getting chilled at night, by lying with the surface of the body exposed. When much indisposed, he should keep constantly in bed.

*Treatment of the Second or Stage of Prostration.*  
*Indications.*

The treatment of this stage of the disease, calls for the greatest promptness, energy, and decision. The friends of one who falls into it, should not lose a moment in sending for medical aid; or in doing that which may be done without the advice of a physician.

The objects to be accomplished, are:—1. To re-excite the activity of the nervous system. 2. To equalize the circulation of the blood, by inviting it to the surface, and thus diminishing the overpowering congestions of the vital organs. 3. To restore the heat of the skin. 4. To re-establish the secretions that are suspended, and to improve the con-

dition of those which are perverted. 5. To stop the vomiting and purging. 6. To allay the spasms.

It will be observed, that these indications are not framed with reference to the disorder of any particular organ, as the root of all the rest, and the cure of which would be, in figurative language, the eradication of the malady. We do not know which organ is primarily affected; and did we, it is still probable, that efforts directed upon the organs sympathetically or secondarily affected, would be absolutely necessary to the preservation of the patient, while we should be engaged in correcting the morbid state of the one first affected, and from which the other morbid actions had emanated. If any one of the practical indications which I have laid down, can be fulfilled, the patient is, in general, safe; for its accomplishment either implies or leads to the fulfilment of other indications. Thus, the heat of the surface cannot be restored without regenerating the suspended nervous influence, and equalizing the circulation of the blood; and if these important ends be accomplished, an increase of temperature is the necessary consequence; and the means which quiet the spasms in the extremities, must, at the same time, allay those of the alimentary canal, and thus abate the vomiting and purging. Still further, as the blood accumulated in the central organs, which it oppresses, and renders the patient weak, is drawn towards the surface, his strength must rise. Finally, from this cause, in connexion with an improved state of the nervous functions, the secretion of bile,

of perspiration, of urine, and of carbonic acid from the lungs, will, as a matter of course, be re-established, and the infiltration of the albuminous elements of the blood, through the mucous membrane of the bowels, be arrested. Thus it is that the various objects, here proposed to be effected in the stage of prostration, are firmly linked together, and may be prosecuted at the same time; each supporting and imparting efficacy to all the rest.

In different cases, it will happen that different symptoms predominate. Thus, one person may have a profuse diarrhœa, without vomiting; another may vomit violently, without having diarrhœa; a third may have both; and a fourth, neither. The cramps, numbness, and spasms, may, in some patients, be the most appalling symptoms; while in others, the reduction of temperature may be so great, as to constitute that the principal feature. Now, as this or that feature of the malady may predominate, the treatment ought to vary. Hence, it is extremely difficult, especially for one who has not seen the disease, to lay down what is called a plan of treatment. In the midst of every diversity, however, there are certain things to be done, which should never be omitted. But let us come to details.

*Management of the Stage of Prostration by a  
Physician.*

On the approach of the stage now under consideration, the individual should at once take to his bed,

and not rise from the horizontal position, nor make any avoidable exertion, till he has passed through it. If convenient, a flannel shirt should be put on him, and his bed be well provided with blankets. If the weather be cold, the room should be heated by fire, but care should be taken to have a good supply of fresh air from without.

If the patient is of a vigorous constitution, and has not been wasted away, by previous diarrhœa or any other debilitating disease, and he is seen by the physician before the powers of life are greatly reduced, he should be bled. At the same time, a powder composed of one or two grains of opium and ten or twenty of calomel, triturated with sugar, should be thrown on his tongue, and washed down with peppermint tea, weak brandy and water, or a small glass of mineral water; and this portion may be repeated every hour. Or, as a substitute, he may take thirty or forty drops of laudanum with as many of spirit of hartshorn, or ether; or the same quantity of laudanum with twenty drops of essence of peppermint, or a tea spoonful of tincture of cinnamon or lavender. If, however, he should vomit but little, and feel great oppression of the stomach, he should drink two or three teaspoonfuls of common salt or powdered mustard, in a tumbler of warm water, or weak lye for the latter, which will, in general, operate as an emetic, affording very considerable relief, and preparing his system for a more favorable action of the laudanum, calomel, and aromatics. If his bowels

should be costive, which occasionally happens, a warm injection, rendered active with common salt, asafoetida, or spirit of turpentine, should be resorted to. From the moment the heat of the surface begins to fail, frictions, with the hand in preference to any thing else if the skin be dry, should be diligently employed; and when these are terminated, the limbs should be surrounded with bags of hot sand, or a pudding of saw dust or bran. The same application should be made to the pit of the stomach and along the spine. To certain parts, especially those just named, and also the insides of the legs and arms, poultices of mustard, or rags dipped in warm spirit of turpentine, or the oil of monarda dissolved in alcohol, should be applied and left on till they excite pain. If the patient can bear the motion of being placed in a bathing tub, a bath as hot as it can be borne, and rendered stimulating with salt or ardent spirit, may be tried. While in the bath, frictions should be used and continued after he is taken out. The paroxysm having advanced to the degree of complete collapse, or prostration with a pulse scarcely or not at all perceptible, blood-letting may still be tried, for the purpose of diminishing visceral congestion, and promoting the circulation; and the time when the patient is in the bath will be most favorable to the operation.

Such is the summary of the treatment which has generally been pursued in the stage of collapse or prostration, and often proves successful, but often

fails. When its effects are beneficial, the pulse of the patient rises; the vomiting and diarrhœa abate; the heat of the skin returns; the cramps abate, and urine and bile again begin to manifest themselves. The stage of prostration is now over, but the patient may still be in danger. If a speedy convalescence do not ensue, a third stage, that of consecutive fever with inflammation, may come on; and, if not properly treated, at last prove fatal. To this sinister result, a continuation of the stimulating treatment after the fit of prostration is gone, must greatly contribute; the means just recommended, should, therefore, be laid aside, or used to a limited extent only, as soon as reaction is fully established. The patient may now begin to take food, but it should be to a limited extent only, and of the mildest kind. Gruel, barley water, thin arrow-root jelly, milk and water, and weak soups, are all that should be allowed for a few days; and even these in moderate quantities, if there should be a tendency to inflammation. It has been found, moreover, that relapses are easily induced, and that among the causes of a return of irritation in the stomach and bowels, none are so operative as abuses of diet. Next to these may be ranked exposure to a cool and damp atmosphere, which is highly dangerous in the convalescence from this malady.

Such is the common mode of proceeding in the stage of prostration; but the treatment of this formidable condition, must not be dismissed so briefly.

If all the dangers of the disease do not connect themselves with this stage, its terrors certainly do, and I shall, therefore, continue the subject by some special remarks on the different remedies.

### 1. *Blood-letting, Cupping, and Leeching.*

The recommendation of blood-letting in vigorous constitutions, in the commencement of the stage of prostration, is sanctioned by experience. But it is by no means adapted to every case. Its use subsequently, has been approved and condemned; each party citing experience in support of their assertions; I am disposed to believe each party right, as far as relates to their own experience. We see, in other malignant fevers, that the pulse sometimes rises after bleeding—sometimes sinks, to rise no more. Both of these effects have no doubt followed its use in Cholera, according to the temperament of the patient, the period of the disease, and the degree in which the nervous system is prostrated. It has been said, that when the blood no longer circulates in the extremities, to extract any portion of it, must increase the danger. But this is fallacious. The peril of the patient does not arise from too *little* blood in the *external*, but too *much* in the *internal* parts. If the plethora of the vital organs can be diminished by blood-letting, the condition of the patient will probably be made better; and what is thus drawn off, cannot lessen the quantity in the extremities, if the pulse has become nearly or quite stopped. Indeed, expe-



rience has shown, that whatever may be the manner in which venesection operates, it is frequently followed by a fuller circulation in the extremities, and a more vigorous action of the heart—whose cavities and nutrient vessels were engorged with carbonized and half decomposed blood.

It is a *desideratum*, to know by the symptoms, which cases will admit and which not admit of blood-letting. Laennec lays it down as a rule of practice in all diseases, that if the pulse should be weak, but the impulse of the heart strong, we may bleed, but if both are weak, venesection is prohibited. Perhaps this rule might be applied to Cholera, and thus the stethoscope be made to guide us through the difficulty. In the absence of the means of making an *apriori* decision on this point, it will only remain to observe the effects of the flow of blood, and terminate it when the circulation becomes more feeble and limited, instead of expanding. As to the practical difficulty of drawing blood, would it not be obviated, in part, at least, by resorting to the jugulars or the temporal arteries? and would not the extraction of blood from those vessels be more beneficial, than its extraction from the veins of the extremities?

On the subject of blood-letting in Cholera, Mr Greenhow, one of the ablest writers on the Epidemic in England, holds the following language.

‘I have hitherto said little on the subject of this powerful remedy—powerful when employed at the auspicious moment—powerless, when attempted to

be used at a later or an earlier period. When we are fortunate enough to be called to a patient before the pulse fails, still more before the serous evacuations commence, when he is suffering from the symptoms which so frequently occur in the first stage — nausea or vomiting, purging of bilious matter, vertigo, head-ache, probably injected conjunctivæ, pain in the abdomen or at the pit of the stomach, with a quick, sharp, or oppressed pulse, and probably occasional cramps in the legs—a full bleeding will be found of the greatest benefit, not only in relieving the existing symptoms, but in averting the impending horrors of the second stage of the disease; this effect may perhaps yet be produced, although the pulse have become feeble and still more oppressed, but not when imperceptible. In such cases it expands and increases in strength and freedom, as the blood flows. If, however, asphyxia, coldness, and blueness of the extremities have fairly established themselves, the attempt to obtain blood is vain; thickened and stagnant as it is in the vessels, it cannot be made to flow, and if a few ounces be squeezed from the orifices, it hangs from them in long strings, accumulating like stalactites, without producing any beneficial effects. On the contrary, it fatigues the patient, exposes him to the prejudicial influence of cold, and suspends for a time more efficient means of relief. I must, therefore, hold bleeding in these circumstances to be inadmissible, principally, because it cannot be accomplished; and the attempt injurious,

since it diverts attention from measures of less doubtful utility, because they are really practicable.'

The able and experienced editor of the *Medico-Chirurgical Review*, inclines to the opinion, that blood-letting has not been found as beneficial or even safe, in Europe as in Asia, which arises, he thinks, from the more sudden invasion of the malady in the latter than the former country.

As to cupping and leeching, the writers on Cholera generally agree, that on account of the bloodless state of the skin, they cannot often be performed. When practicable, however, blood should be drawn from the epigastrium. But cupping without scarification, may do good. My respectable friend, Dr Heermann, Senior Surgeon of the Navy, many years ago found great advantage in the endemic cholera of New Orleans, from dry cupping; and in imitation of that gentleman, I have often directed it with advantage in similar cases.

## 2. *Emetics.*

As already intimated, many of the worst cases of Epidemic Cholera are not attended with vomiting. That symptom, indeed, seems on the whole to be less violent, than we are accustomed to see it in the endemic of this country. We need not be surprized, then, to learn that emetics have been administered both in Asia and Europe, with decided advantage. To be efficacious, they should be exhibited early, and the more stimulating should be preferred. If

tartar emetic should be chosen, it ought to be dissolved in a fluid that will excite; such as brandy and water, or an infusion of peppermint, cayenne pepper, ginger, or mustard; or paregoric or laudanum should be added to its aqueous solution. As a stimulating emetic, a mixture of powdered mustard in warm water, or a strong solution of common salt, has been found highly efficacious; and is strongly recommended by Mr Searle. The mustard emetic is, I believe, of Asiatic origin, and was first administered by the Hindoos. Of its use in England, Mr Greenhow speaks in the following language.

‘In the cold blue and pulseless stage of the intense type of the disease, I believe it to be a very valuable remedy, in relieving the irritation of the stomach and exciting reaction; but when full vomiting can be excited by milder means, especially when it can be done by copious draughts of warm water only, I consider it safer to avoid the irritating effects of the mustard.’

Dr Haslewood and Mr Mordey, in Sunderland, used the mustard emetic with advantage, in the stage of collapse, after the spontaneous vomiting had ceased; but they preferred ipecac in brandy to mustard.

The great power of full vomiting, and this in every case where emetic medicines are used, should be the object in view, in reviving the sensibilities of the nervous system, giving impulse to visceral circulation, determining the blood to the surface, and res-

toring perspiration, has long been known to practical men, and fully explains its beneficial operation in Cholera Epidemica. Vomits are adapted, however, but to the stage of depression. When inflammation and febrile reaction have come on, and the patient labors under gastro-enteritis, arachnitis, or spinitis, they would of course be inappropriate and often injurious.

The experience of many British practitioners in India, has been decidedly in favor of the emetic practice. I will lay before the reader a few extracts from Mr Searle's book on Cholera.

‘Mr Wilson observes, “the natives of this country, among whom the disease is by no means unknown, are in the habit of giving to those affected with it, a strong solution of common salt in water; some give the following mixture—one pice weight of onion juice, and two pice weight of arrack; both these have violently emetic effects, but they say they are very successful in treating it in that manner.”’

‘The testimony of Mr Neilson is, in part, as follows:

“I had been informed that emetics had been used in the spasmodic Cholera with advantage, and I gave them a trial, the result of which was very satisfactory; the solution of tartris antimonii, two grains in an ounce of water, was given in half ounce doses every half hour, till free vomiting was produced, and it was encouraged by copious draughts of warm water. The whitish watery matter was at first ejected from the stomach, but the operation of the

emetic being promoted, some bile was brought off; and the stools, which had continued whitish and watery, gradually assumed a bilious, or rather, a more natural appearance and a better consistence. As a strong determination takes place to the surface from the operation of the emetic, it hereby produced very beneficial effects; in the body, and particularly the extremities, which had felt cold and chilly, the circulation and natural heat were soon restored; and the pulse, which had been very feeble, or scarcely perceptible, become regular and distinct."

' Mr Barton, who prescribed tartar emetic in large doses, reports its effects in these words:

' " At an early and severe period of the prevalence of the disease, when neither the number of cases nor the severity of the symptoms indicated a milder form, the tartrate of antimony was had recourse to. I must confess it was with diffidence, and some degree of anxiety and fear, I had recourse to a medicine known to act as a powerful emetic, and in a disease where constant vomiting is so prominent a symptom; accordingly, I used it in the first two or three instances, in doses of one grain with five grains of calomel; its effects emboldened me, and I had it given in doses of two or three grains. One of the first effects of the tartrate of antimony, and what I looked on as an important one, was, in almost all cases, bringing off the ingesta, which had been retained, though the vomiting of congee-like water had been pre-

viously urgent and frequent; ten or fifteen minutes after the ingesta were thrown up, after waiting to see if the stomach was emptied of them, a second dose was administered. Every means of keeping the patients well covered now were strictly adhered to, to cause the tartrite of antimony to act on the skin. The dose was repeated every hour, or two hours, according to the urgency of the case. When the patients could be kept steadily covered, the first favorable symptoms were, a slight degree of heat about the shoulders, which gradually and slowly extended downwards; the countenance lost its collapsed and ghastly look, and the pulse began to be indistinctly felt, and the cold clammy sweats wore off." "

Dr Reich, of Berlin, in a pamphlet on Cholera, appears as the advocate of tartar emetic.

' His plan of treatment was this. Dissolve ten grains of emetic tartar in seven ounces of water, and give half an ounce every two hours, continuing the medicine, even after the evacuations have ceased, till appetite and natural fœces are restored. The first effects are, more copious purging than vomiting; but these soon cease, *tolerance* of medicine being, in a short time, established. He allows the patient plenty of cold drink—prohibits all heat and frictions—gives no other internal remedy—and states that, by the above measure, he cured 119 out of 123 patients.' \*

\* Medico-Chirurgical Review, April, 1832.



### 3. *Calomel and other Purgatives.*

As indulgence in eating is often the exciting cause of Cholera, the stomach and bowels, at the onset of the disease, are generally surcharged with recremental matters. Experience has demonstrated, that spontaneous vomiting and diarrhœa, do not necessarily rid the canal of these ingesta. Barley water dejections may continue for hours, and the mucous membrane still remain oppressed and irritated, by half digested aliment. On the early removal of such matters from the stomach, much of the efficacy of emetics manifestly depends. It is equally important to expel them from the bowels; and whenever the alvine evacuations have not been copious and feculent, cathartics are required. The greatest difficulty in their use, arises from the irritable state of the stomach. That which irritates least, and at the same time is most difficult to expel, is calomel. It may be slow, however, in passing the pylorus, for the action of the stomach is far from favoring its advancement. Should it reach the duodenum, its effects must generally prove beneficial. All the world know, that few remedial agents act so powerfully on the portal viscera; and few things, in clinical medicine, are better ascertained, than the efficacy of this medicine in sporadic and endemic cholera. In the terrible malady now impending, it has disappointed no reasonable expectations. Mr Searle is its eulogist, and his citations of the experience of others, speak greatly in its favor.

It has been given in every variety of dose, from one to twenty or thirty grains, every two or three hours. For myself, I have generally seen large portions, at distant intervals, more efficient in quieting the stomach, and correcting the morbid secretions, than small doses frequently administered. The physicians of the West should constantly bear in mind, that *our* summer and autumnal diseases, call for the liberal use of calomel; and that the Epidemic Cholera will, among us, demand a more liberal use of this medicine, than it has required in Europe. It should be given in powder, instead of pills, which are more easily thrown up. Camphor or aromatics sometimes reconcile the stomach to its impress, and are peculiarly proper when the prostration is great. But the most useful adjuvant is opium, of which I shall presently speak.

Other cathartics than calomel, have been employed, of which the chief are Epsom salts, ol. ricini, and magnesia; the last, especially, when the excretions give evidence of acidity. Small and repeated doses of these medicines seem to succeed better than large portions. The efficacy of the castor oil will be much greater, if spirit of turpentine be added to it. This practice has been found beneficial in England.

Mr Searle has collected from the practitioners of India, or rather from their Bengal and Madras reports, a considerable mass of testimony in favor of

this class of medicines, and is led by its perusal to offer the following remarks:

‘Purgatives. This section renders it very clear, that these remedies have not been duly appreciated. On the contrary, the aqueous purging which has been so generally present, and so frequently the first symptom complained of, having led to the inference, that the extreme languor and depression of the powers of life were, in no inconsiderable degree, dependant on this symptom as a cause—a primary object of practice, arising out of this view, has been, to arrest this evacuation, and to suppress the action of the bowels, as well as of the stomach. But the error of this system, I think I have already rendered apparent; if not, the testimony here adduced, bears ample proof in favor of the opposite practice, and exhibits purgatives in the character of a most valuable auxiliary. Indeed, it would be astonishing, that we should have neglected a class of remedies so strongly recommended to us, by the success attending the exhibition of castor oil, by M. Duffin, in the same disease of 1787, and the testimony of Mr Anderson, and other of the practitioners of those days, in favor of bleeding, purging, and emetics; but for the fact, that our minds are all pre-engaged by the opium and stimulant plan, which was promulgated by authority, on the recommendation of Mr Corbyn, with whom it was said to have proved so eminently successful.’

The Medico-Chirurgical Review strongly recommends the following formula.

R Rhubarb, half a drachm;  
 Ginger, five grains;  
 Brandy, one ounce;  
 Water, the same;—mixed.

When the bowels have been already well evacuated, this mixture may be infused and strained, and two ounces of water, with twenty grains of soda or magnesia may be added to it. Or, in place of this, the same work recommends the tincture of senna.

Others, as Mr Dodd, of England, have strongly recommended Croton oil, which, according to that gentleman, ‘abates the spasms and restores the secretions.’

We are not prepared to sanction copious and repeated purging. Among other sinister effects, it prevents perspiration. In the forming stage of the disease, it might be highly beneficial; in more advanced stages if carried to much extent it could scarcely fail to increase the exhaustion of the patient and the irritation of the mucous membrane.

#### 4. *Injections.*

In many cases, injections are valuable. When a deficiency of feculent evacuation, affords ground for suspecting accumulations in the great intestines, although watery discharges should occur, common purgative injections, particularly those which contain spirit of turpentine, should be administered. In

desperate cases, after the discharges have been copious, astringent injections, with starch and laudanum, might do good.

But injections of a different kind may be used. Mr Greenhow, of England, has thrown into the bowels, by a forcing syringe, three or four pints of water, *as hot as it could be borne*, rendered stimulating with brandy, camphorated spirit, or Castile soap, and speaks in high terms of its efficacy. The water appeared to communicate its heat to the neighboring organs. Mr Fife pursued the same method, sometimes adding laudanum to the water, with a similar result. He observed that when the water was discharged, it was 'astonishingly reduced in temperature.' This practice seems to me to promise a great deal.

### 5. *Antacids.*

Dr Granville, of London, (not experienced in Epidemic Cholera,) has published, on that malady, a catechism for the use of the people. He speaks with great confidence of the virtues of an aromatic alkaline solution, the composition of which he has not given. From the dose in which he directs it, we may conjecture, that it is a solution of caustic potash, united into a liquid soap with some kind of essential oil. However this may be, I should expect much, in certain cases, from such a compound. Magnesia administered in new milk, by Mr Scott, of India, proved successful in some cases, even when the *primæ viæ* seemed to be free from acid.

Mr Searle supposes the benefit may be attributable to the milk. The effects observed by Mr Scott, certainly merit consideration.

One of the best antacids in common cholera morbus, is a weak lye of fresh ashes and soot. It deserves a trial in Epidemic Cholera. It may be prepared in a few minutes, and the patient should frequently drink a wine glass full of it.

It is, probably, in the early periods of the disease, that acidity prevails in the stomach and bowels, and antacids are called for. In more advanced stages, when the serous portions of the blood begin to exude into the bowels, the carbonate of soda of that fluid predominates, when, of course, antacids are not required.

## 6. *Narcotics.*

From the time when Sydenham first poured out his 'liquid laudanum,' to the present hour, the preparations of opium have been stereotyped prescriptions for cholera. This certainly speaks much in their favor, as few medicines continue long to enjoy an *undeserved* reputation. In the choleras of America, no physician is ignorant of the excellent virtues of opium. Nearly thirty years ago, Dr Edward Miller, of New York, recommended a combination of calomel and *opium*, in the cholera of children; and for most of that time, I have been accustomed to employ it, with satisfactory success.

It appears, however, from the concurrent experi-

ence of a great number of practitioners, that the preparations of opium, have not often succeeded in Epidemic Cholera. Both laudanum and solid opium, have been administered in every variety of dose, but the results, *on the whole*, have been less beneficial than might have been expected. The chief cause of failure, appears to be the engorged state of the brain—always augmented by narcotics; and keeping this in his eye, the physician will have little difficulty, in deciding on the cases which may or may not, admit of the use of this medicine. In full habits, its effects must of course be prejudicial, and, in most cases, it must follow, not precede venesection. Every experienced physician knows, that blood-letting is the proper predisposing measure for the use of opium. With due reference to the condition of the brain and bowels, this narcotic may undoubtedly be given with much comfort and advantage to the patient. Its power over spasmodic action, when not sustained by continued local irritation or cerebral congestion, is universally admitted; while its *indiscriminate* employment in Epidemic Cholera, or any other disease, must necessarily be attended with sinister effects.

Other medicines should be added to the opium. Mr Greenhow speaks with approbation of the union of five grains of calomel with one of that medicine. In this country the proportion of the mineral should be greater, say, fifteen or twenty grains, and much may be hoped for, from such a compound. The opi-



um should be in fine powder, and intimately blended with the calomel and a quantity of sugar. In this state it may be projected on the tongue of the patient, and washed down with his ordinary drink. Thus swallowed, it will be difficult for the stomach to eject it.

**TOBACCO** infusions, administered as an injection, have been proposed and employed, by Mr Baird and some other medical gentlemen of Newcastle, England. He has reported several cases, in which this medicine proved beneficial; and, avers that he has not seen it do any harm. He was led, as I have intimated when treating of the pathology of the disease, to the employment of this medicine, from the conviction, that the prostration of the circulation arose chiefly from a prolonged contraction, or systolic state of the ventricles of the heart, which he proposed to relax by the impress of tobacco.

‘The first change,’ says he, ‘which takes place after the exhibition of the injection, is restoration of the circulation, as evinced by the increase of volume in the pulse, and restoration of the livid parts of the body to a more healthy hue. The cessation of cramps next ensues, and afterwards the suspension of vomiting and purging. Last of all, the re-establishment of the bilious and urinary secretions.’\*

The infusion should not be so strong as that directed in the books for strangulated hernia.

\* Mr Greenhow.

I shall leave the reader to form his own conclusions relative to this medicine. It certainly should not be ventured on, except in vigorous, masculine constitutions, and in the early period of the disease.

I do not discover that the salts of morphia have as yet received a sufficient trial, to test their efficacy in comparison with opium. The following formula would perhaps prove useful.

℞ Sulphate of morphia, two grains;

Sulphuric ether, two drachms;

Simple syrup, four ounces.

A table spoonful, for a dose, in some water.

### 7. *Sudorifics.*

Epidemic Cholera is attended with such a signal failure of the functions of the skin, that sudorifics are obviously indicated. Some of the British practitioners in India, have given tartarized antimony for this purpose, with advantage. This practice, at first view reprehensible, may perhaps be worthy of adoption. We should be disposed to recommend the medicine in large doses, combined with opium, in a solid form. In this manner, an antimonial action might be speedily established in the nervous and circulatory systems; which would generally be followed by increased secretion from the mucus membranes and skin. We should feel little apprehension of augmented vomiting from this practice. Ipecacuanha has, also, been employed with advantage, and probably operates as a diaphoretic. But

neither of these remedies is adapted to a state of *exhaustion*, however admissible they may be in that of *depression*. We are not aware, that hot water in large draughts has been drunk. Might it not prove beneficial? Would it not be absorbed, when the vomiting was not incessant, before its temperature was reduced to that of the body, and by its heat stimulate the heart and other indundated organs into more vigorous action?

#### 8. *Stimulants and Antispasmodics.*

Brandy, whiskey, camphor, cayenne pepper, the volatile oils of cajuput, peppermint, cloves, lavender, cinnamon, and other aromatics, the tinctures of the same, sulphuric ether, and ammoniated alcohol, are among the active stimulants which have been administered in Epidemic Cholera. The extreme prostration of the vital forces, would seem to call for prompt and powerful stimulation; but although it has often done good, it has failed, and not unfrequently proved injurious. When the brain is oppressed, this class of medicines may make the matter worse; and in cases less congestive, but more inflammatory, they occasionally do harm, by the excitement they create. In persons previously enfeebled, or possessing the lymphatic temperament, they are most likely to prove beneficial; but even to these, they cannot be administered indiscriminately, and in any dose, with advantage; while to those of a sanguine temperament, and vigorous constitution, or

whose bowels have ejected nothing but gruel-like excretions, and are still loaded with feculent matters, they cannot fail to do serious injury.

It is right, however, that I should make the following extracts from the Report of the French Academy of Medicine.

‘M. Noel, in the midst of a pretty extensive epidemic, performed wonders by means of liquid ammonia, given several times a day in an aromatic infusion. M. Deville quickly dissipated the disturbances by the aid of a large dose of ether, administered immediately on the accession of the disease. Every where opium has been associated with diffusibles, with musk, with camphor, ether, or essence of mint; every where have been prescribed with success, tonics, bitters, and aromatics.

‘Quite recently, Doctor Leo has endeavored to prove, from a great number of convincing facts, that the method most constantly efficacious against the Cholera, consists in the employment of sufficient doses of the sub-nitrate of Bismuth, one of the most active antispasmodics with which we are acquainted.’

In protracted stages of collapse, it should be recollected, that the stimulants and antispasmodics must be frequently changed. The system soon loses its susceptibility to any one of them, but may still be excitable to another.

### 9. *Tonics.*

The analogy between Epidemic Cholera and congestive intermittent fever, has occurred to many

physicians, who have witnessed both diseases; and the known efficacy of the sulphate of quina in the latter, has suggested its use in the former. Dr Hamett (Med. Chir. Rev.) advises its union with calomel. I have found the quina to lessen the frequency, and increase the fulness of the pulse, tranquillize the nervous system, and promote perspiration; effects, which, produced in Cholera, could not fail to prove beneficial. Engorgements of the viscera, in malignant intermittents, constitute no prohibition to the use of this medicine, which more certainly relieves them than any other; and why then should it not be administered in Cholera, attended with the same congestions? As to other tonics, they would seem to be indicated only, or chiefly, in the stage of convalescence.

#### 10. *External Applications.*

The centripetal tendency of the fluids in Epidemic Cholera, has suggested to the profession and the people, wherever it has prevailed, an early and persevering resort to external applications. When successfully used, they revive the sensibility of the skin; refill it with blood, and restore the lost functions of calorification and perspiration. In proportion as these effects are brought about, the internal organs are relieved of plethora and irritation; the heart and brain, being liberated, act with greater regularity and power; the secretions are revived, and the spasms cease; though certain parts may simultaneously pass into a state of serious inflammation.

Heat has been the active agent in most of the external applications which have been used. 1. The hot bath, made stimulating with salt, mustard, or ardent spirits. Although this has been lauded by some, the greater number of physicians have preferred other modes. The time necessary to the preparation of the bath; the absence in most families of a bathing tub, in which the patient can lie down; the danger of his sitting up; and the exhaustion of his strength in getting in and out of the bath, are practical objections of some moment; but it has been thought, that, independent of these, the liquid medium is less beneficial than a gaseous or solid. Mr Brady, of England, however, found meal or bran poultices, in bags, applied to the limbs, useful; and Mr Greenhow thought the bath decidedly beneficial. It should be as hot as it can be borne. Hence, 2, hot air, steam, and the vapor of burning spirits, have been preferred by many practitioners, but when the limbs are very cold, solid bodies, as *media* of heat, do much better than gases. For applying the latter, the portable vapor bath of Dr Jennings might be employed. As an easy and cheap method of applying steam, I may mention a suggestion made to me by Mr French of this city. He proposes to have a lid turned out of wood, fitted into the top of a common stew-pot. An augur hole must be made through this board, and a wooden or tin tube inserted, of such length as to reach the patient. It may either be bent or have an elbow in it, near the lid. The

patient may recline in a box or bathing tub, covered with blankets, or otherwise, or if very weak he may remain in bed. The steam should be thrown in near the bottom. Whiskey, camphor, or other stimulants may be added to the water, or made to replace it, in the vessel. It is necessary to confine the lid, so as to prevent the escape of the steam. 3. The patient, or his lower extremities only, may be surrounded with hot ears of Indian corn, or bags of hot meal, ashes, or what is preferable to either, sand. 4. Frictions, with dry and hot flannels, rags dipped in spirit of turpentine or tincture of cantharides, or impregnated with powdered mustard; lastly, the warm hands of the attendants, unarmed with any medicinal agent. Of all the modes, the last is perhaps the best. When the limbs are bathed in cold perspiration, it should be wiped off with dry and warm towels. In most of these methods, the effects depend chiefly on the application of heat, but its efficacy is greatly augmented by friction; and hence, of all the applications to the skin, those mentioned under the last head, seem to have been most beneficial. 5. Sinapisms, cataplasms with cayenne pepper, and blisters, applied to the epigastrium, spine, and insides of the thighs and arms, are not to be omitted, except for more speedy and potent modes of stimulation. 6. In the Western Journal, Dr Awl, of Ohio, has recommended from experience, when the limbs are cold and shrivelled, in endemic cholera, to cover them with tight flannel rollers, and sat-



urate these with hot oil of turpentine; a powerful application certainly, and one which seems well adapted to the Epidemic disease, in which the bandages, by compression, might tend to repress the spasms and cramps of the limbs. This method has actually been employed in England with decided advantage. 7. Would not the sulphur bath prove beneficial in this stage of the disease, by relaxing the spasms, as well as communicating heat? Sulphur once had considerable reputation as an antispasmodic. If there was any foundation for this pretension in its favor, one might think well of trying it in Cholera. Taking a sulphur bath is generally followed by copious perspiration. 8. Electricity and galvanism, directed through the heart, have been resorted to, but their effects do not seem to have been considerable. 9. Lastly, The cold affusion has been efficacious. This is a Persian remedy. It has been adopted with advantage in Europe. Dr Ainsworth, one of the Sunderland practitioners, after speaking of the inefficacy of certain remedies, observes:

‘It is quite evident, then, that another line of practice must be adopted, and this should be the use of cold affusions; a practice much in vogue in the East, and since introduced into the Cholera hospitals of the continent, with marked success.

‘One of the physicians of the Cholera hospital at Berlin, in writing upon this subject, says: “In those living corpses which are struck with asphyxia, lying cold, and without any pulse, external and in-

ternal stimuli cease to be so; inasmuch as the debilitated asphyxiated frame cannot, in its turn, act upon them. No steam apparatus, however vaunted; no warm bathing; no friction; no excitement, is sufficient in these cases." And this is what I am sure every person who has seen the disease will coincide in. Though produced from internally, outwards, and not externally acting inwards, *asphyxia pestilentialis* bears a strong relation to death by frost, in which there is an icy coldness of the surface, a want of pulse, and great congestion of the central parts. In these cases, we use frictions of cold snow, &c. until a gradual warmth is restored; and it is on the same principle, that sudden cold affusions, are indicated in Cholera. So forcibly did this strike medical men in this country, as a neglected remedial measure, that when the *Berlin Cholera Gazette*, which contained the notice of its successful employment, was made known, every writer was anxious to show that he had himself previously advocated its adoption.

'The patient is placed in an empty and dry bathing vessel or tub, and several buckets of cold water are poured on him, while the regions of the stomach and back are subjected to a kind of shampooing, or friction; and this process must be repeated, if the urgency of the circumstances requires it. No physic is given, and cold water is allowed for beverage. If the pulse revives, the affusions are continued in a tepid bath, and the patient is put to bed, where perspiration is excited by gentle fric-

tions with cold flannels. It must be kept carefully in mind, that cold affusions are only applicable to the second period of the disease, and not to the first; and it is not a universal remedy, but can only be used in particular cases. To secure the convalescence of the patient, it is only necessary that he should be carefully watched, and all symptoms of returning heat and vitality, or recurrence of the usual secretions, be assisted by the exhibition of warm restoratives and gentle aperients, taking care to avoid local inflammation.'

I am disposed to view this practice with great approbation. The water should be very cold, dashed on suddenly, and the application not continued very long. The *shock* imparted in this manner to the nervous system, could scarcely fail to be reviving. The subsequent hot applications, frictions and irritants, would have greater effect. The hot and cold bath might, indeed, be employed alternately. I should expect much from such a practice.

*Treatment of the Third Stage, or that of Consecutive Fever with Inflammation.*

If Epidemic Cholera be divided into three stages, every individual who is seriously ill, must of necessity suffer the perils of the second stage; but may have the first so briefly, that it can scarcely be observed; and need not experience the third in any degree whatever. A part of the subjects of this malady, however, do pass into a state of consecutive

fever, which is often obstinate and sometimes proves fatal. The type of this fever will vary in different times and places, according to the immediately previous reigning constitution; and, therefore, the treatment must vary.

We have already seen, that in India, the consecutive fever of Epidemic Cholera is much rarer than it has proved to be in Europe, either on the continent or in Great Britain.

In Asia, assuming the remittent bilious type, it called for the treatment appropriate to that malady, in the East. In Europe, where a typhus constitution of the atmosphere generally predominates, it has commonly put on the symptoms and required the treatment of that fever. It has, also, in some places eventuated in dysentery. In America, especially in the valley of the Mississippi, we may expect to see it assume the characteristics of autumnal fever—or perhaps of the second or typhoid stage of that endemic. Whether we contemplate it in the garb of a paroxysmal, or a continued fever, we are warranted in looking upon it, as a disease in which some one or more of the vital organs, is in a state of congestion or inflammation; while the general system is more or less impaired, in its living properties and powers; and hence that the diathesis of the patient, is not often that of intense inflammation. With this state, there is, generally, a faulty or suspended condition of the secretions remaining from the stage of prostration, for the actions of the vascular and nervous

systems may be revived; but continuing morbid, cannot restore the impaired secretory functions; and this circumstance will contribute still farther, to complicate the pathology.

Hence arise the indications—1. To moderate and tranquillize the morbid condition of the general system. 2. To relieve the inflamed organ. 3. To restore the suspended, impaired, or vitiated secretion.

In Europe, the organ more commonly affected with inflammation, is the brain or its membranes; but the lining membrane of the stomach is frequently involved. In this country we shall often have the same combination; but may expect, much oftener than in Europe, to find the liver implicated; while in all cases the fever will, perhaps, assume a paroxysmal, rather than a continued type.

Of the necessity of blood-letting to fulfil the first indication, experience has left no doubt. The extent to which it should be carried, must be decided by the judgment of the physician, exerted upon each case. It may be laid down as a general rule, that copious and repeated venesections, will not be either required or admissible. The poisoning of the nervous system, by the direct action of the remote cause, and its augmentation by the presence of deteriorated blood, must render large detractions of that fluid in most cases prejudicial. However, a sanguine temperament and vigorous constitution; early or middle life; good living, and exemption from a wasting

diarrhœa in the first stage, may so far favor the development of an energetic inflammatory action, as to render a liberal resort to the lancet indispensable to the safety of the patient.

But the reduction of the powers of the sanguiferous system, is not all that is required in this case. That system in common with the other parts of the organism is irritable, and requires to be soothed. After blood-letting, it must be tranquillized. To this end the patient should make a liberal use of diluents, demulcents, and the vegetable acids. The free absorption of water into the blood cannot fail to render it less irritating to the containing vessels. But a different class of remedial agents are of great value in these cases. I allude to narcotics, especially opium and the saline compounds prepared from it. They should not be given alone. Something to act specifically on the secretory organs will be a necessary adjuvant. Thus Dover's powder will be excellent, or a compound of that medicine and calomel; or a combination of opium and tartar emetic; or a solution of the sulphate of morphia, in the wine of ipecac, the narcotic in all cases being in such quantities as to produce something of its characteristic sedative and soothing effects. In many cases, prescriptions like these will answer, without venesection.

The second indication, that of relieving the inflamed organs, is chiefly fulfilled by local blood-letting. Whether the affected organ be the brain, the lungs, the stomach, or the liver, this remedy, by



means either of cups or leeches, will be appropriate—often highly beneficial. When the inflammation is seated in the membranes of the brain, it will be important to keep the feet warm, while subtepid or cold affusions are made to the head. When the brain is in a state of congestion merely, or is irritable without being inflamed, a state which cannot always be distinguished from subacute inflammation, the subtepid affusion will be preferable to the cold, or indeed any other application; when the inflammatory state is declared, and the development of heat considerable, the cold affusions should be perpetual. Wherever the inflammation may be seated, counter irritation after venesection will be useful. Should the heat of the system be equable, the vesication may be made near or directly over the inflamed organ; but if the lower extremities be cold, the blisters should be applied to them. When the inflammation is in the brain, cathartics will be proper, as they divert so powerfully from that organ; if in the lungs, they will do less good; in the liver, they may be useful; in the stomach, injurious. When the lungs are the seat of disease, the tincture of digitalis with nauseants and demulcents, will be proper. When the brain and stomach are affected, almost total abstinence from food is necessary. When the liver chiefly suffers, calomel, as in other cases of hepatitis, is required.

The third indication, that of restoring the suspended secretions, must necessarily be effected, in



part, by the means requisite to the other two. Thus the union of ipecac or tartar emetic with opium, although designed to allay the irritability and morbid sensibility of the nervous and vascular systems, must contribute powerfully to restore the functions of the skin, especially if aided by diluent drinks, of a sudorific character, as balm, sage, Virginian snakeroot, or thoroughwort—*eupatorium perfoliatum*. Should the kidneys remain inactive, they may be excited by carbonate of soda, nitrate of potash, the tincture of muriated iron, spirit of nitrous ether, or spirit of turpentine, administered in elm bark mucilage, an infusion of parsley root, or other diuretic vehicles. If the biliary secretion continue suspended or otherwise unhealthy, as evinced by the appearance of the alvine discharges, it must be restored by the use of calomel, or calomel and opium, or the blue pill with ipecac, according to the judgment of the practitioner. When the liver is torpid rather than inflamed, the union of mercurials with tonics and stimulants, such as rhubarb, extract of gentian, aloes, and mustard, will be attended with good effects. The nitro-muriatic bath is adapted to the same pathological state, and bathing the feet or sponging the region of the liver, with acid water of the usual strength, can scarcely fail to promote a flow of bile.

The intestinal secretions often remain impaired, in this stage of the disease, and cathartics have been recommended. If there be inflammation of the

mucous membrane, they are inadmissible. When that membrane is extremely irritable, the mildest only should be used; and even these should be combined or followed with an opiate. Sometimes, however, the bowels are sluggish and insensible, with an abundant mucus. In these cases, cathartics of a more active and irritating quality, such as calomel and jalap, the common pills of calomel or the blue mass, united with aloes, scammony, colocath, and other resinous purgatives, or an infusion of senna and manna, will be attended with excellent effects.

When the disease assumes an intermittent character, the sulphate of quinine, or the bark itself, should be administered.

As relapses are exceedingly apt to occur, the patient should carefully avoid every irregularity which experience has shown to be prejudicial, in the recovery from other acute diseases.

### *Treatment by the People.*

I shall conclude this chapter, with some familiar instructions to the people, for the management of the disease when it makes a violent onset, and medical aid cannot be immediately had. What is done, or left undone, in the first hour of the stage of prostration, generally decides the fate of the patient.

As soon, then, as the Epidemic begins to show itself, every family should be provided with the following, or other articles of a similar kind.

Laudanum,

Spirit of hartshorn,

Ether,

Essence of peppermint, each one ounce.

Spirit of turpentine, one bottle.

Several ten grain doses of calomel, in powder.

Powdered capsicum, two ounces.

Mustard unadulterated, one pound.

One box of soda powders.

A quart of French brandy, or old whiskey.

A quantity of sand, and bags of different shapes and sizes to contain it, when applied.

One or two coarse brushes, fit to rub the surface.

Old flannel.

A bathing tub, when it can be afforded.

In addition to which, as the disease often makes its attacks in the latter part of the night, every family, when it is prevalent, should keep a small lamp burning in their chambers, throughout the night; and also, make such provision, before retiring, as would enable them to have a fire and hot water at any hour.

When an individual is seized with vomiting and purging, or either, attended with distress in his stomach or bowels, and great weakness, he should, if the much-dreaded Epidemic Cholera really prevail at the time, be regarded as attacked with it; and not a moment should be lost in adopting measures for his relief.

*In every case, a messenger should be immediately despatched for medical assistance.* Every family, and all individuals not connected with families, should, before hand, fix on at least two physicians, to one of whom they would send, in the event of being attacked. One of these should be the family physician; and the other, a substitute for him, in case he cannot be found.

Meanwhile, the patient's feet should be hung off the bed, into a tub of salt water, as strong as brine, as hot as he can bear it, and frictions applied to them with the hands, until he is turned round on the bed, from which he should not rise; and in which his lower extremities should be well covered with blankets, and kept warm by bags of hot sand, or otherwise.

While the bathing goes on, a mustard poultice should be prepared, (by stirring the flour into a little hot water,) and applied hot, over the pit of the stomach. It ought to be as large as the two hands of a grown person.

As soon as an individual is attacked, if he do not vomit freely, and especially if he have eaten a hearty meal not long before, he should drink a tumbler of warm, weak lye, made from the fresh and clean ashes of the fireplace, into which should be thrown two or three heaping teaspoonfuls of the flour of mustard seed. This will at once correct the acidity of the stomach, excite a salutary vomiting, and, to some extent, revive the sunken energies of his system.

But if the puking have already been great, and the stomach is cramped, he should take from a half to a teaspoonful of laudanum, with twenty or thirty drops of spirit of hartshorn, or ether, mixed in some weak lye; which, when the ether is given, should be cold. In an hour, or, if violent spasms and cramps in the limbs come on, in half an hour, this dose may be repeated.

In the mean time, the patient should, occasionally, drink a gill of weak lye, made of ashes and soot; and if his thirst be urgent, he may take, now and then, a small glass of mineral water, prepared from the portable soda powders, to which a little brandy or whiskey may be added. But, in the use of this drink, he must, from the chilling effects of the soda water, be somewhat abstemious.

Should a physician not arrive within a reasonable time, and the disease continue to rage, ten grains of calomel, mixed with a little sugar, should be thrown on the tongue of the patient, and washed down with spirit and water; and mustard poultices, sprinkled with powdered capsicum, may be applied to the insides of the thighs, above the knees; or, in place of them, flannel bandages dipped in hot spirit of turpentine, may be wrapped firmly round the same parts. Throughout the whole stage, it should be recollected, that the patient, for no purpose whatever, should be allowed to get out of bed, or even rise from a horizontal posture.

## CHAPTER VII.

## PREVENTION AND MITIGATION OF THE DISEASE.

THE means of prevention and mitigation, have been repeatedly indicated in the course of this work, but it may be useful to embody them in a separate chapter. The whole might be classed under two heads—*public* and *private*, in which order I shall treat of them.

1. *Quarantines.*

All the governments of Europe have resorted to quarantines, but still the disease has continued to advance—a strong evidence that it is not contagious; or if contagious, that it also propagates itself in some *other* way. In a quarantine warfare, it may be truly said, that we are ‘fighting the wind.’ In the Western States, we are not immediately interested in maritime quarantines; and, therefore, I shall say no more of them.

2. *Sequestration of Inland Towns.*

The public journals inform us, that over most of Europe, the Epidemic has been met by military cordons, which have been extended around cities where the disease prevailed, and stretched across the great roads, so as to cut off all communication between what was called the *infected* and the *unin-*

*fected* districts; but the enemy has every where passed them by unheeded. Now, quarantines are comparatively harmless restrictions—mere works of supererogation, and may be *tolerated*, even by the most strenuous non-contagionists; but not so with restrictions on land. They are fraught with many evils, unmitigated by a single benefit. I shall dwell upon them for a moment. When the news of Cholera sickness in Quebec reached Cincinnati, regulations to prevent its contagion, were immediately proposed in our City Council; but no steps to this end, have, I believe, been taken. Other towns, in the valley of the Mississippi, have possibly indulged the reverie of shutting themselves up from the pestilence. They who cherish this scheme, have thought little on the consequences of its execution. In the first place, even in the despotic kingdoms of Europe, where such restrictions could be best enforced, they have not stayed the march of the disease a single hour. Secondly, such restrictions cannot be executed without a military force, and a superintending head. Thirdly, the health of those who are thus shut up, invariably suffers. Fourthly, the losses in business, and the discomforts and inconveniences, consequent upon such restrictions, are calamitous in the highest degree. I cannot but hope, therefore, that no state government or civic corporation in the West, will undertake so mad an enterprise. Look at the example of New York. Did not her legislature and people exert their utmost power to confine the pes-



tilence to the shores of the St Lawrence? And has it not already settled over the valley of the Hudson? Did not the disease appear in her Capital, and disperse the very Assembly which the day before had sent out a decree against its approach! And has it not overspread her great Emporium, without any human eye having been keen enough to see by what channel it approached! These are facts which should instruct us. They display the utter fruitlessness of all restrictions on the social and commercial intercourse of society, and call loudly on us to prepare for that which we cannot avert.

### 3. *Abatement of Nuisances.*

Every where the Epidemic has prevailed more, and displayed a deadlier power, in proportion as filth and stagnant water abounded. In this, it but conforms itself to most other epidemics. The first duty of the municipal power, in every town, then, is to remove all kinds of filth, and perfectly to ventilate every spot in which it has been accumulated. The means of effecting this purification, must necessarily vary in different places; but however diversified, they should be applied with promptness and energy, and directed to the actual *removal* of the nuisance—not to covering it up, and decomposing it. In employing water for this purpose, it should be used in the forepart of the day, that it may not increase the dampness of the night.

Not the least reliance is to be placed on lime and

its chloride as *direct* preventives of Epidemic Cholera; and no great confidence ought to be reposed in their power over nuisances. It is far better to remove putrescent matters, than to correct their stench with lime, or even the boasted chloride. Moreover, an imprudent use of the last may and often has proved injurious to health; the chlorine gas, which is liberated, being, if breathed undiluted with atmospheric air, a more deadly poison than that which produces Cholera. I would not, however, entirely discourage the use of these articles. Nuisances which are irremovable may be sprinkled daily with one of them; and spots from which removals have been effected, should be subjected to at least one application of the same kind, care being had in all cases to promote free ventilation. With respect to cellars containing water, and ponds, within the precincts of a town, they should have been emptied during the cold weather. Now that it is hot, if the water they contain be of considerable depth, it had better be let alone. If however, it should be drawn off, the slime accumulated in the bottom, should either be removed, or buried up deeply with fresh earth, to which a quantity of lime or its chloride should be added.

#### 4. *Cholera Hospitals.*

The experience of Europe is against large and distant hospitals, for the reception of Cholera patients. Too much time is consumed in placing the

patient in them; and he does not bear the fatigue of the journey, especially if made in a carriage, and has sometimes sunk under it. It is far better to establish temporary hospitals or receiving houses, in the different parts of the city; to which patients may be brought without loss of time, and in which they may be attended, or at least visited, by their friends. These houses should, of course, be near to the most unhealthy districts, rather than in them. For convalescents, and those whose cases become protracted, a hospital out of town, on some healthy spot, should be provided, so that none who are not seriously ill, need be long retained in the receiving houses.

#### 5. *Medicines for the Poor.*

It is the duty of municipal corporations, to provide at the public expense, and place within the reach of the poor, such medicines and other auxiliary means, as are likely to be required. The variety of articles need not be great. An appropriation for this purpose may save many valuable lives, that would otherwise be lost. In every town, even of happy America, there are numerous families and individuals, who participate but little in the general prosperity, and when assailed by a mortal disease, cannot compass the means of purchasing the requisite medicines.

#### 6. *Retreat to the Country.*

Lastly, is it advisable on the approach of Epidemic Cholera, for the inhabitants of towns and

cities, to disperse into the country? If the Epidemic, like the yellow fever, invaded the former only, such a step would be indispensable to safety; but it affects both town and country, and there is not, therefore, any certain security in a flight to the latter. In general, however, it seems to have been more prevalent and mortal in the crowded and populous parts of towns and cities, than in the country; and, hence, it is desirable that as many as conveniently can, should go from the former to the latter. The thinning of the population in such places, will be for the common good.

They who go to the country, should do it at the onset of the Epidemic, before their systems have been acted on by the remote cause. When there they should avoid crowded rooms, and too free an indulgence in the vegetable productions of the season. They should choose dry and elevated situations; and not place themselves remote from competent medical aid. Under these limitations, a sojourn in the country would be advisable, upon the advent of the Epidemic.

Let us now inquire into means of prevention that are personal and private.

### *1. Domestic Cleanliness and Ventilation.*

Housekeepers, on the approach of Epidemic Cholera, should bring their habitations and the grounds attached to them, into the utmost state of cleanliness; and throwing open every recess and confined situa-

tion, promote free ventilation. They should use water copiously, but not in the evening, as lodging in damp rooms is apt to induce the disease.

## 2. *Personal Cleanliness.*

This refers to the skin, rather than the clothes. The latter may, indeed, be quite clean, while the former is foul and unhealthy. To preserve the surface of the body in a salutary condition, a warm bath should be taken once or twice a week, and the shower bath occasionally; but especially should the body be washed every morning, on rising from bed, with cold water, and immediately rubbed dry with a coarse towel.

## 3. *Use of Flannel and Muslin.*

Both flannel and muslin, next the skin, will be preferable to linen. It is especially proper to keep the trunk of the body covered with flannel, or at least bound moderately tight with a bandage. Those who perspire freely, should change their flannel on going to bed. In all cases, when flannel cannot be obtained, muslin may be substituted. Those who are subject to cold feet, should bathe them occasionally in cold water, or in hot brine, rub them well, and wear woollen hosiery.

## 4. *Night Air and Lodgings.*

When Cholera, or any other summer or autumnal disease prevails, it is dangerous to sit out late in the

evening, after a hot day. Exposure to the atmosphere of the morning, on the contrary, is beneficial.

A great reason why Cholera so often makes its attack between midnight and morning, is, that persons are apt to lie uncovered at that, which is the cool time of night, and get chilled. During the Epidemic, the night clothes of every one should be so made and worn, as to supply the place of bed clothes, and save the surface of the body from the action of the night air.

No one should sleep under a window, or exposed to a current of air; but, on the other hand, it is unhealthful to sleep in confined and crowded apartments; and, during the Epidemic, every family should disperse itself as much as possible over the house. As to the different stories of the house, the higher should be preferred to the lower for lodgings. The basement is worst of all. One reason why Cholera so often attacks the poor is, that very many of them lodge in basement stories.

Why should not those who can afford it, put gauze screens into their windows, at night, as has sometimes been done in Italy, with the apparent effect of preventing intermittent fever? If really efficacious in the latter case, they might be so in the former. They would at least serve to exclude the musquitos, in places infested with that insect.

### 5. *Violent Exertions.*

Throughout the Epidemic, all great and trying exertions, both of body and mind, should as far as possible be avoided. They are apt to excite the disease.

### 6. *Diet.*

To ward off the Epidemic, our diet should be temperate but generous. All extremes are to be avoided. Excess and deficiency are alike prejudicial. It should be both animal and vegetable; and the best rule of selection is, to prefer those articles which experience may have taught each individual is best suited to his constitution. If either animal or vegetable food should predominate, it ought to be the former; and it may be rendered more stimulating than usual with spices, provided the individual be not feverish. All wide departures from the ordinary habits of each person may prove injurious. Long fasting should be considered as improper. Physicians, and all others, who during the Epidemic are compelled to go abroad in the latter part of the night, or early in the morning, should eat something, and if convenient, drink a cup of coffee before starting out.

### 7. *Drinks.*

I know of no reason why these should be varied in any material degree on account of the Epidemic. Those who are unaccustomed to ardent spirit,



should not resort to it under the Epidemic, unless they be indisposed, and use it as a remedy; for while the *temperate* individual is in health, his safety cannot be increased by the use of whiskey or brandy, but the reverse. In all such, a fit of intoxication is likely to induce an immediate attack.

In reference to those who are habitually intemperate, it is an established fact, that the Epidemic has been to them peculiarly fatal; which, by some persons, has been ascribed solely to their drinking *while* the disease is prevalent. Such indulgence, however, except when carried beyond the *average* of the *daily* stimulation of the individual, is not what gives him a great liability to the disease. It was his *previous* intemperance which broke down his constitution ~~and predisposed him to the disease, and this~~ predisposition would be increased by his ceasing to drink. Such a cessation would produce debility, which is well known to invite the disease. Habitual drinkers should, therefore, continue to drink, during the reign of the disease, but not indulge in fits of drunkenness, for these are necessarily followed by greater weakness and still greater liability. If those who have long been accustomed to stimulate themselves to excess, were to take a pill of two or three grains of opium, at late bed-time, the effect of which would continue through the latter part of the night, I have no doubt it would contribute to their preservation.

*Conclusion.*

Among the Epidemic diseases which, at various times, have overwhelmed society, none has ever required so much from the rich and intelligent, as that which has recently carried terror into three quarters of the globe. Strongly disposed to spare those who dwell in the midst of comforts, while it smites the impoverished and wretched—frightfully rapid in its progress, and commonly fatal in its termination when not met by appropriate means—but in most cases intimating its approach, and generally curable if timely aid be administered—it presents a case which should animate the wealthy and influential, to every kind of charitable exertion.

~~It is especially incumbent on physicians to go among the ignorant and obscure, and instruct them~~ how to live, so as to avoid the pestilence; what to do in the event of being attacked; and where to look for medical aid, in the hour of dismay. To this end, every physician should be willing and prepared to *give* his services to the needy. Medical men are, indeed, the legitimate defenders of the country, when invaded by an epidemic disease, and should adopt as their motto, that the post of danger is the post of duty and honor.

An equal obligation rests on civil magistrates, clergymen, and all the enlightened and charitable members of society; who should not only make known, or provide the means of prevention and cure, for the

indigent, the ignorant, and even the vicious; but labor to dispel their alarm, and exhort them to meet the enemy with courage and composure. Fear is a powerful predisposing cause to Epidemic Cholera; and the remark has been often made, that it generally turns aside from those who face it boldly—whether this confidence be the offspring of constitutional causes, of philosophy, or of the higher and holier principle of faith in the wisdom and goodness of an overruling Providence. All persons of moral influence should especially exert themselves, to disabuse the public mind of the great error, that the Epidemic spreads by contagion. No other opinion could interfere so fatally with the preservation and comfort of the sick. To go into a contagious atmosphere, is like marching upon the cannon's mouth, and calls for a degree of courage which is given to the smaller number only. Let the important fact, that those who wait on the sick are not more liable to attacks than those who leave the dying to close the eyes of the dead, be deeply impressed on the whole community, and no one will be abandoned to hirelings and strangers, in the hour when the arm of friendship might arrest his descent into the 'valley and shadow of death,' or the eye of love and pity shed its cheering light upon the gloom. The dread of contagion has sometimes even deprived the sick of the last and most precious of all earthly consolations—those which flow from the prayers of the righteous; for it is recorded, that in one of the towns

of England, where a belief in contagion prevailed, a clergyman was seen at midnight, engaged in prayer, on the *outside* of the house of a dying man—afraid to enter, lest he himself might contract the pestilence. Such are the melancholy fruits of this popular error.

FINIS.

## POSTSCRIPT.

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JULY 23, 1832.

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WHEN this volume went to press, it was a matter of speculation whether the disease on the St Lawrence, was any thing more, than the cholera morbus of this country, in a more malignant character than usual. But every hope of this kind has vanished. The unequivocal reports of Dr Bronson of Albany, Drs Dekay and Rhineland of New York, and Drs Meigs, Jackson, and Harlan of Philadelphia, have shown that the Epidemic of Quebec and Montreal is identical with that of Asia and Europe; while the bills of mortality demonstrate that the disease, so far from having lost any of its virulence, is at least as fatal as it has ever been in the old world.

Its onset at Quebec was about the 8th of June—at Montreal about the 10th—in many of the intermediate villages within a few days of the latter date.

In the first week of the present month, it commenced in Albany, and about the same time was announced in the city of New York, where in two weeks, or up to the 16th, it had carried off between five and six hundred, almost entirely of the impoverished and intemperate. Near the same time it appeared among the troops who had marched from New York and other places, under General Scott, and were passing up the lakes in steamboats, for the northwest frontier. On the 11th inst. it was extremely mortal at Fort Chicago, on the southern extrem-

ity of Lake Michigan. Meanwhile it broke out in Detroit, where it has proved fatal in many cases, and gave rise to a flight of the inhabitants into the country."

On the 16th it was announced by the Philadelphia Board of Health to have begun in that city; and about the same time cases occurred in Newark and Plainfield, New Jersey. Accounts received to-day, represent it as having appeared in New Haven.

There is no longer any ground for hoping that we shall not be invaded. Indeed, nothing is more probable than its spread over the whole United States; and no duty more urgent than that of preparing to meet it.

I have not heard of any new and more successful method of treatment, by the physicians on the St Lawrence and the Hudson, than that pursued in the old world; and from the great proportion of deaths in America, we may infer that no improved method of cure has yet been proposed by her physicians.

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